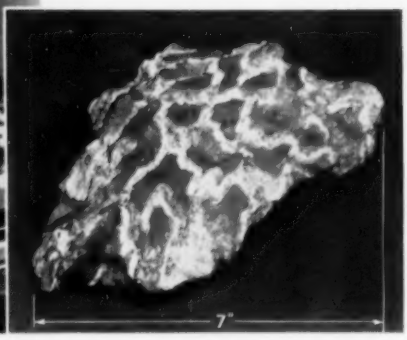
ACI News Letter

Vol. 28, No. 6 JOURNAL of the AMERICAN CONCRETE INSTITUTE December 1956

When completed in 1957, glamorous Habana Hilton Hotel will cover a full city block and be Cuba's largest. Resting on a firm INTRUSION-PREPAKT foundation, it will have 630 rooms in its 22 stories and be completely air conditioned.

Owner: Federation of Culinary Workers of Cuba
Agent and Contractor: Frederick Snare Corporation
Consulting Foundation Engineers: LeRoy Crandall & Associates and Prof. Jose Menendez

Unretouched photo shows how porous Pleistocene coral (white) was filled with INTRUSION grout (gray). Over one million gallons of INTRUSION grout were pumped into hotel foundation.



newest Hilton hotel rests on grout-intruded coral

INTRUSION-PREPAKT grouting techniques have assured a strong, stable foundation for the Habana Hilton now under construction in Havana, Cuba. The porous coral rock under this $14 million structure was strengthened by pumping some 147,000 cu. ft. of INTRUSION grout.

Faced with a foundation material that could not take the footing pressures, Consulting Engineer Jose Menendez called in INTRUSION-PREPAKT. With their extensive experience in foundation stabilization, I-P engineers demonstrated that grouting would provide the best and lowest cost answer to the problem.

All grouting work was done by trained INTRUSION-PREPAKT crews and completed on schedule. The use of INTRUSION grout with its high strength, excellent penetrability and ease of handling assured that all voids would be filled and maximum strength developed.

When difficult foundation problems arise, perhaps you, too, can save time and money with INTRUSION-PREPAKT methods and materials. For information, contact: INTRUSION-PREPAKT, Inc., Room 568-B, Union Commerce Building, Cleveland 14, Ohio. In Canada: INTRUSION-PREPAKT, Ltd., 159 Bay St., Toronto, Ont.

INTRUSION-PREPAKT, INC.

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ACI

News Letter Contents

December 1956

On the Cover—Vital gateway to Puerto Rico's growing economy is $35,350,000 air terminal building at San Juan. Gates are reached by handsome stair structure shielded by corrugated plastic windscreens. Panels of concrete block and precast concrete louvers enhance an efficient design. Picture-story appears on p. 23 of the News Letter.

—*Photograph courtesy Tippetts-Abbett-McCarthy-Stratton*

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Change in Policy

DISCUSSION PAPERS MOVED FORWARD

Discussion of papers published in the July to December, 1956, JOURNALS (*Proceedings* V. 53) will be published in the June, 1957, issue as the last section of that issue, in accordance with recent action by the Technical Activities Committee. Discussion of papers appearing in the remainder of the volume (JOURNAL V. 28, *Proceedings* V. 53) up to June 1957, will be published in Part 2, December 1957.

Reduce delay

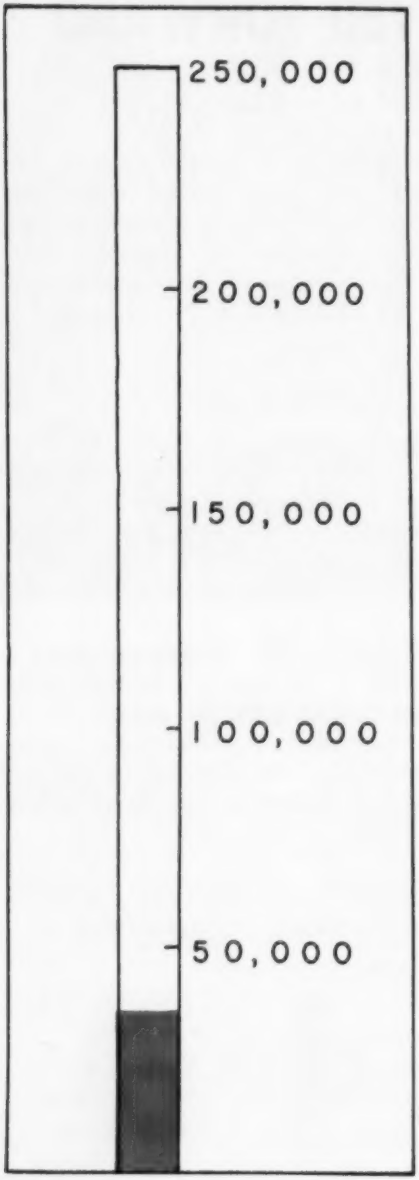
This change in publications policy has been undertaken to reduce the long delay in publication of discussion of JOURNAL papers. Under the old procedure discussion of July, 1956, papers would not have appeared in print until December, 1957, 1½ years later.

Further change

For *Proceedings* V. 54, July 1957 to June 1958, and the years following, a further change will be made to speed discussion publication. The period allowed for submitting discussion will be reduced to 3 months, and discussion will be published quarterly as follows:

Papers published in:	Discussion published:
July, August, September	March following
October, November, December	June following
January, February, March	September following, Part 2
April, May, June	December following, Part 2

BUILDING • BAROMETER •



Following an organizational period during the summer months, the Building Committee in mid-September began its campaign for funds to construct the new ACI headquarters building.

Getting a head start in organization, the subcommittee on engineers and architects in private practice headed by Raymond E. Davis was, on October 31, well out in front in contributions received. Other divisions of the Building Fund drive, as shown in the following tabulation, are beginning to make their efforts felt and are expected to swell the total materially by the time of the next report in the January News Letter.

Contributions by Category as of October 31, 1956

Engineers and architects in private practice	$17,306
Reinforcing steel industry	5,000
Admixture manufacturers	3,075
Cement producers	2,100
Special contributions	1,000
Concrete products producers	250
Concrete machinery and specialty products	235
Ready-mixed concrete and aggregate industry	100
Membership at large	100
Total	$29,166

Notice to contractor members of ACI

The Building Committee has decided to request bids on construction of the ACI headquarters building from a selected list of Detroit area contractors **plus** any contractors who are members of the American Concrete Institute and who wish to bid the job. A $100 deposit for plans and specifications, refundable on their return in good condition, will be required.

The date on which plans will be available is still tentative but those ACI members desiring to bid are requested to notify the ACI Secretary-Treasurer so that they may be individually contacted when a firm date has been set. Please do not send deposit until requested to do so.

ACI CONVENTION IN DALLAS

Tentative Program Set for Feb. 25-28

Tentative program for the 1957 ACI convention to be held February 25-28 at the Statler Hilton Hotel in Dallas has been announced.

Monday, February 25, has been designated as Technical Committee Day. With Frank Kerekes presiding, the first Tuesday session will discuss the proposed standard for evaluation of test results of compression tests of field concrete and the Detailing Manual. Committee reports on hot weather concreting and coatings for concrete will also be presented.

A breakfast for program participants will spark Tuesday's events. Thor Germundsson is chairman for the day's session on prestressed concrete. A progress report of ACI-ASCE Committee 323 scheduled will include discussion of the correlation between Bureau of Public Roads and Committee 323 requirements. Other reports will deal with object and scope of the committee, prestressed concrete design requirements, materials, and construction.

Major sessions on construction, design, and materials are planned for Wednesday, February 27. Walter H. Price will be chairman of the construction session; papers will cover U. S. Bureau of Reclamation trends and specifications for concrete, concreting the Dallas Memorial auditorium, concrete for sewage works, and prestressed concrete for hangars.

Telling the story of the glamorous convention site, the 21-story, Y-shaped Statler Hilton Hotel, will be Wayman C. Wing. His talk is one of four set for the design session to be conducted under chairman Douglas McHenry. Other speakers will spotlight apartment building in Dallas, blast resistant design, and strength of slender reinforced concrete columns.

MAKE RESERVATIONS EARLY

Reservations for the forthcoming ACI convention in Dallas may be made directly to the Statler Hilton Hotel. Information on accommodations and rates will be furnished by the hotel upon request.

Opening the materials session will be A. Allan Bates, chairman. Topics of interest to the industry will include portland slag cement, fly ash concrete, concrete pipe, and temperature effects on concrete strength.

On Thursday, February 28, a research session is to be developed by Committee 115, under chairmanship of S. J. Chamberlin. The final session of the convention, directed by Cedric Willson, will feature lightweight aggregate developments. Topics range from high-pressure steam curing to structural applications; and using expanded shale aggregates.

A complete preliminary program appears on the following pages.

Dallas Convention—continued from p. 5

FEBRUARY 26

FIRST GENERAL SESSION

Proposed Standards

Committee 214—Evaluation of Test Results of Compressive Tests of Field Concrete
Committee 315—Detailing Manual

Committee Reports

Committee 605—Hot Weather Concreting
Committee 616—Coatings for Concrete

FEBRUARY 26

PRESTRESSED CONCRETE

Progress Report of ACI-ASCE Committee 323

Correlation between the Bureau of Public Roads and Committee 323 Requirements—E. L. Erickson
Object and Scope, Chapter I—C. P. Siess
General Remarks on Design, Chapter II—M. J. Holley, Jr.
Specific Points in Design, Chapter II
Materials, Chapter III—Howard Simpson
Construction, Chapter IV—Curzon Dobell

FEBRUARY 27

CONSTRUCTION SESSION

Trends and Specifications for Reclamation Concrete—Lewis H. Tuthill, California State Department of Water Resources, formerly U. S. Bureau of Reclamation
Concreting the Dallas Memorial Auditorium—Jack E. Rosenlund; George L. Dahl, Architects and Engineers
Concrete for Sewage Works—E. C. Wenger, Portland Cement Association
Prestressed Concrete Hangar—David P. Billington, Roberts and Schaefer Co.

DESIGN SESSION

Apartment Building in Dallas, Texas—Frank W. Chappell, Consulting Engineer
Blast Resistant Design of Farmers Union Building—S. Arthur Axtens, Consulting Engineer
Strength of Slender Reinforced Concrete Columns—Ivan M. Viest, University of Illinois
Design of Statler Hilton Hotel, Dallas—Wayman C. Wing; Stevenson, Value and Knecht

MATERIALS SESSION

Portland Slag Cement—Bryant Mather, Waterways Experiment Station
Fly Ash Concrete—R. H. Breckenridge, Texas Power and Light Co.
Study of Concrete Pipe in Service—W. J. McCoy, Lehigh Portland Cement Co.; R. J. Sweitzer, Lockjoint Pipe Co.; and Martin E. Flentje, American Waterworks Association
Effect of Temperature on Concrete Strength—Paul Klieger, Portland Cement Association

FEBRUARY 28

RESEARCH SESSION

Program to be presented by Committee 115, Research

LIGHTWEIGHT AGGREGATE SESSION

High-Pressure Steam Curing of Lightweight Aggregate Concrete—Rudolph C. Valore, Jr., Texas Industries, Inc.

Lightweight Aggregate Concrete for Structural Applications—J. J. Shideler, Portland Cement Association

Lightweight Expanded Shale Aggregate and Its Use in Structures—R. A. McCann, Basalt Rock Co.

Institute participates in Nebraska programs

Co-sponsor with the American Concrete Institute at three recent Nebraska technical programs was the Nebraska Concrete Masonry Association.

Paul F. Rice, ACI technical director, spoke on "Structural Design of Concrete Masonry Walls," in Lincoln, Grand Island, and Omaha.

Mr. Rice gave a history of various measures to overcome objectionable cracking due to shrinkage and temperature movements, and also suggested practices for specifications, design, detailing, and construction. His audience included architects, engineers, concrete products plant personnel, Corps of Engineers personnel, and NCMA members.

Examinations announced

Three examinations for positions of interest to students who wish to combine their college study with on-the-job training in a federal establishment have been announced.

They include student trainee civil engineering, and student trainee engineering, for duty principally with the Bureau of Reclamation in the western states and in Alaska; and for highway engineer and trainee for duty with the Bureau of Public roads throughout the United States.

Full information regarding the requirements and how to apply is contained in announcements No. 10-1-7, No. 10-1-8, and No. 75 B. The first two, describing civil engineering and engineering work for the Bureau of Reclamation, may be obtained by writing the U. S. Civil Service Commission, Central Board of U. S. Civil Service Examiners, Bureau of Reclamation, Denver Federal Center, Denver. The third, concerning highway engineering trainee and highway engineer, is available from Executive Secretary, Board of U. S. Civil Service Examiners for Highway and Bridge Engineers, Bureau of Public Roads, Washington 25, D. C.

Errata

The following corrections should be made in "Guide for Ultimate Strength Design of Reinforced Concrete," by Charles S. Whitney and Edward Cohen, appearing in the November JOURNAL.

p. 465—Eq. (22), the denominator of the first fractional term following equal sign should be

$$\frac{0.15\,t}{d} + 1$$

instead of

$$\frac{0.15\,D}{d} + 1$$

p. 469—Eighth line from the bottom, ". . . planes of the existing moment" should read "planes of the resisting moment."

p. 470—Delete last prime sign at end of Eq. (33).

p. 471—Seventh line should read in part "Charts 2-15" instead of "Charts 2-14."

p. 478—Chart 3 applies to eccentricities less than or equal to t/20, not t/10.

* * *

The following correction should be made in "Particle Interference in Concrete Mixes," by B. J. Butcher and H. J. Hopkins, appearing in the November JOURNAL.

p. 553—". . . grading analyzed in Table 2" should read "grading analyzed in Table 1."

ACI REGIONAL MEETING IN CAN

Technical Papers, Symposium, Tours Comprise Program

ACI's Ninth Regional Meeting, Montreal, October 24-27—the Institute's first regional meeting to be held in Canada—drew close to 600 to the technical program. The first 2 days of the meeting were devoted to technical papers and symposium at the Sheraton Mount-Royal Hotel; the last 2 days featured trips to various plants and inspection tours of St. Lawrence Seaway construction sites.

Subjects covered in the technical papers included aggregate processing, prestressed and precast concrete, effect of sand grading on air entrainment, bridge design and construction, lift-slab construction, field testing with the impact hammer, St. Lawrence Seaway construction, and winter concreting.

PROGRAM BREATHER—Taking breather between symposium detail at ACI's Ninth Regional Meeting are M. F. MacNaughton (left), technical program director, and John F. Brett, educational committee chairman who presided at Session No. 2

Session No. 1

Chairman for the first session was Prof. Jacques Hurtubise, Department of Civil Engineering, Ecole Polytechnique de Montréal. The session featured papers on air entrainment, heavy-media processing of aggregate, and prestressed concrete bridge.

"Effect of Stone Sand Grading on Air Entrainment in Concrete"—Jean Chartrand, engineer, Department of Sales, Canada Cement Co., Ltd., Montreal

Six stone sands with different gradings were prepared, each one having a predominant quantity of particles of a certain size. The grading of the sand was varied by increasing, one at a time, each of the quantities determined on a standard series of sieves, the others remaining constant.

The six stone sands were then used in three groups of concrete mixtures in which one of the following quantities varied, the others remaining constant: (1) quantity of air-entraining agent, (2) percentage of sand to total aggregates, (3) cement factor, and (4) water content.

The main characteristics of each of the three groups were as follows: Basic mix proportions in the first group were chosen similar to those used in a practical air-entrained concrete but without any air-entraining agent. Basic mix proportions of the second group

ADA ATTRACTS ALMOST 600

were chosen similar to those used in practical mixtures without air entrainment. Basic mix proportions of the third group were chosen similar to those used in practical mixtures with air entrainment.

Group 1 concrete, without air-entraining agents, was made to demonstrate the influence of the grading of manufactured sand on a concrete without entrained air as opposed to the concrete with entrained air of group 3 for the same mix proportions. It was noted that sand grading has a slight influence on the amount of entrapped air. The percentage of entrapped air increased as the percentage of sand increased. The variation was less appreciable when the cement factor was varied.

Group 2 also dealt with mixtures without purposely entrained air but mix calculations were such that the proportions closely approximated proportions used in practical mixtures.

In general it seems that the sand fraction 30-50 (passing sieve No. 30, retained on No. 50), followed by the sand fraction 50-100 and 16-30, are the ones which in decreasing order entrap the greatest quantity of air. As in group 1, it was noted that when the percentage of sand in the total aggregate was increased and when the cement factor was increased, the percentage of entrapped air plus accidental air increased. It was also noted that the drier the mix the more air entrapped.

Group 3 included mixtures made with two different air-entraining agents. A more plastic mixture made with a greater quantity of water contained more entrained air than a drier mixture. As the percentage of sand to total aggregate increased, the percentage of total air increased, part being an increase in entrained air and part in entrapped air.

The cement factor also had an influence on the air entrainment in concrete. In the types of mixtures used in these tests, when the cement factor is high, little air is entrained (about 1 percent); when cement factor is small or medium, percentage of entrained air is 2 to 3 percent (total air 4 percent).

REGIONAL FIRST—Discussing success of ACI's first regional meeting ever held in Canada are Frank Kerekes (left), Institute president, and Gerald Milson, general chairman for Montreal regional meeting

The quantity of air-entraining agent necessary to entrain air in a concrete made with manufactured sand is greater than required in a concrete made with natural sand.

In all cases of mixtures made with a sand that had a predominate portion of particles passing the No. 100 sieve and an air-entraining agent, the total quantity of air was less than that found in the other mixtures having a different predominate particle size of sand in an identical design. It was concluded that an excessive quantity of fines prevents the air entrainment.

"Heavy-Media Processing of Gravels in New Brunswick"—J. D. MacKenzie, geologist, The Shawinigan Engineering Co., Ltd., Montreal

Some 200,000 cu yd of concrete will be required for the Beechwood development of the New Brunswick Electric Power Commission on the St. John River. A major portion of the concrete will be exposed to severe frost action and concrete in the gate section must resist the erosive action of high velocity flood discharge.

There were numerous gravel terraces and bars along and in the river near the Beechwood site. However, examination of these

COMMITTEE SESSION—Comparing notes for regional meeting are quartet responsible for program's scope: H. Fred Senez (left), inspection trip committee member; D. F. Nash, secretary regional meeting committee; James H. Royds, registration and entertainment committee, and R. O. Beauchemin, who was head of the publicity committee

gravels indicated that there was too high a percentage of unsound, porous, and nondurable particles for the material to be classed as a top quality concrete aggregate. Examination of older concrete structures in the region, reportedly made with these gravels, and laboratory investigations confirmed that this material would not have the required durability. It was found that the sand as well as the gravel fraction was unacceptable in freeze-thaw tests.

Since the nearest known source of igneous rock was several miles away and would require the setting up of a quarry operation and crushing plant, efforts were directed toward upgrading gravel quality. It was suspected that the trouble makers were the soft porous shales, mudstones, siltstones, porous sandstones, and other particles in the gravels that had a low specific gravity.

It was suggested that the heavy-media or sink-float process be used to remove the low specific gravity particles. A trial separation found that the particles remaining after the lighter 15 to 20 percent of the material had been removed were resistant to damage when subjected to freezing and thawing.

It was decided that the gravel, that is, the plus $\frac{3}{8}$-in. material, would be processed and that the sand fraction would be discarded due to difficulties in carrying out gravities on fine materials. The sand for the concrete was then shipped in by rail.

The plant set-up at the Beechwood gravel pit was as follows. After being excavated the material passed over a dry vibratory screen where most of the sand was removed. Oversize from this screen went to a twin jaw crusher. The crusher product and the undersize gravel were recombined and were passed over a second dry screen where further sand was removed. The gravel was then passed over a horizontal washing screen to remove adherent fines. The washed gravel was then fed into the drum of the sink-float plant. The plant used a medium which consisted of a suspension of ferro-silicon and magnetite in water. The lighter float particles were carried along on top of the flowing medium to the float discharge chute and thence to the float section of the washing screen. The sink material went to the bottom of the sink-float drum where it was picked up by lifters. The lifters dropped it onto a second chute which discharged onto the sink portion of the vibrating washing screen. High pressure water jets washed the medium from the gravel and waste material so that the ferro-silicon and magnetite could be recovered. The sink and float material were conveyed to surge bins, the float being trucked to waste and the sink fraction being trucked to the job site where it was separated into three sizes and stockpiled. The suspension or medium that was washed from the aggregates was pumped to a magnetic separator where the media was recovered and excess water and contaminants discarded.

Production of finished aggregate was nearly 80 tons per hr. As a result of the heavy-media processing, coarse aggregate for the Beechwood development was obtained for less than half the estimated cost of production from any other source.

"Longer Span Prestressed Concrete Bridges–Design Concept and Economic Advantages"—M. Schupack and C. Dobell, chief engineer, and consultant, respectively, The Preload Co., Inc., New York

Indications are that longer span (more than 120 ft) prestressed concrete bridges, when compared to other construction media, show greater percentage saving than has been indicated by the smaller spans in common use.

Costs were compared for various bridges (built and/or in the design stage) in prestressed concrete and structural steel. Comparisons were also made between cast-in-place and precast construction. Experience indicates that where cast-in-place construction is feasible, it is usually structurally preferable and generally more economical.

Starting at about 120-ft spans, the dead load of the prestressed concrete bridges approaches 65 percent of the total load. This indicates that in this span range the use of high-strength, lightweight concrete offers definite possibilities. Research and experience will indicate the feasibility and limitations of such construction.

Mr. Schupack emphasized that "if we approach each bridge design job with the philosophy that we have to provide the practical construction approach rather than an approach which is convenient to the design office, prestressed concrete long-span bridges will have a rapid growth." With the proper use of concrete materials and a better understanding of the various prestressing methods, he believes that prestressed concrete bridges can play a predominant role in the long-span bridge field under present competitive situations.

Session No. 2

John F. Brett, consulting engineer, Montreal, was chairman of the Wednesday afternoon session. Two papers were concerned with prestressed concrete, one with lift-slab construction, and one with bridge design.

"Some Unusual Features in Prestressed and Precast Concrete Applications"—Philippe A. Benn, vice-president and chief engineer, Pre-Compressed Concrete Engineering Co., Ltd., Montreal

The St. Lawrence Cement Co. is utilizing precast and prestressed concrete elements, as well as cast-in-place construction, in the storage hall and two kiln buildings for its new plant. There will be more than 130—80-ton prestressed precast beams, some 300 girders, and some 3000 precast purlins. Roof slabs are of precast cellular concrete. The majority of columns are precast. Design, manufacturing, and erection problems were discussed.

"Practical Applications of Prestressed Concrete in Bridge Construction"—A. M. Lount, T. O. Lazarides, Lount & Partners, Consulting Engineers, Toronto

Where prestressed concrete has proven itself an economical construction medium, it has often done so by simplifying construction problems—as for example, simplification of formwork, of reinforcement, of structural steel, and reduction of construction time.

The judicious use of prestressing makes possible the employment of the simplest of structural forms under circumstances which otherwise would make such employment impossible. For example, for a bridge at the intersection of two main highways, the angles of intersection and the vertical and horizontal transitional curves resulted in awkward dimensions for the bridge deck. After a number of preliminary designs in both structural steel and reinforced concrete, a continuous three-span skew slab was determined to be the simplest solution. However, such a slab was not feasible in reinforced concrete due to the thickness and weight required for the spans in question. Prestressing the slab meant that the thickness of the deck could be kept to approximately 2 ft, a practical solution. Making this structure continuous increased the design problems, but making it into three simple spans to simplify the design would have been at the expense of simplicity of construc-

tion. Cost of the structure was actually somewhat less than square bridges of similar spans in reinforced concrete or structural steel.

A second illustration of simplification involved the simplifying of reinforcement. The structure chosen to illustrate this point was one which would have been normally designed as a reinforced concrete rigid frame. However, limitations on the length of reinforcing steel led to congestion in the neighborhood of splices and increased the difficulty of placing the concrete in the field. A design was made consisting of a simple span, hollow box girder structure with long prestressing cables as reinforcing elements. In addition to producing a more homogeneous structure and simplifying the abutments, the congestion of reinforcement was eliminated.

Another example—by the use of prestressed concrete it was possible to employ rolled steel sections under circumstances where otherwise more costly built-up sections would have been required. This was accomplished both by bringing about composite action throughout a continuous bridge structure and by introducing transverse prestressed concrete diaphragms between steel girders. One of the limitations on the use of structural steel beams on long spans is the deflection under live load. This deflection can be reduced materially by the use of either or both of the methods mentioned above. Continuous composite action was achieved by prestressing the concrete slab over the negative supports. The transverse diaphragms were cast in place between the girders and post-tensioned. Both measures were simple operations; neither increased the cost of the concrete portion of the work to any appreciable extent, whereas the steel costs were materially reduced.

Mr. Lount said they found that a full moment transverse prestressed concrete diaphragm in a wide bridge is extremely economical compared to a similar diaphragm in structural steel with equivalent rigidity.

Another consideration in the selection of bridge materials is speed of construction. Speed of construction may be affected by the availability of the material, the possibility of prefabricating large sections of the superstructure while the foundations are being erected, and possibility of mass production.

Where the erection or transportation of elements raises no serious problems, the use of precast elements has proven successful. Prestressed concrete, particularly pre-tensioned units, lends itself well to the mass production of similar units. On large bridges important savings are possible when prestressed concrete makes it possible to prefabricate on a production line basis.

Prestressed concrete may be used in bridges because of special considerations, for instance, extremely heavy loads. Another factor is that of maintenance and durability. This is especially important in places that are awkward to reach or where maintenance is likely to be infrequent. When maintenance is apt to be costly and difficult this factor alone is often sufficient to warrant the use of prestressed concrete. Low structural depth is another reason why prestressed concrete is often chosen for bridge construction.

"Multistory Lift-Slab Construction"—W. Sefton, consulting engineer, Toronto

Salient features of the lift-slab system of construction were illustrated by showing construction of a number of six-story buildings in Calgary. The system has been used more in western than eastern Canada.

Some of the advantages listed for the method are: (1) speed of construction—two slabs can be lifted in a day with final fixing to follow, each slab can be cast in 2 to 4 days; (2) formwork is almost entirely eliminated; (3) all concreting is done on the ground, as well as the incorporation of all heating and electrical work in these slabs; (4) winter concreting is simplified since protection enclosures can be built at ground level; and (5) beams are eliminated thus giving the architect almost complete freedom in internal arrangements.

There are also some disadvantages in the system. To use the system to its fullest advantage, architects and engineers have to be trained in those features which give the maximum economy in the completed building, which often means that designs planned around some other construction techniques would prove uneconomical. It is difficult to use all types and sizes of columns. For example, for columns higher than about 30 ft concrete columns have not so far proved practical. The equipment is limited to lift-

ing on columns about 45 ft high. This means that in buildings higher than 45 ft that slabs are lifted and parked, and then lifted and parked again, as the column height is built up as often as required by the over-all height of the building.

The reinforced concrete slabs must be such that one can be cast over another, the top of one being under the bottom of the next. This has led to the flat plate being used in most cases; however, with the use of fiberboard box forms, waffle and ribbed slabs have been built. Prestressed slabs have also been erected by the lift-slab method.

The steel columns, which are the only type practical so far for multistory work, are much smaller in over-all size than equivalent concrete columns and consequently the least radius of gyration is a vital factor. It has been found that the box or pipe column is more useful than the WF column, weight for weight, when taking into consideration the Euler formula.

Factors to consider in the lifting sequence include (1) the point at which the columns may be conveniently reduced in size, (2) height at which the Euler load is best dealt with, (3) height required to fix finally as many of the lower slabs as possible and to stack temporarily the upper slabs conveniently for the next lift, and (3) length of jack rods.

The cost savings in lift-slab construction spring from three main factors: (1) elimination of slab forms, (2) concreting of slabs at ground level, and (3) speed of erection. Mr. Sefton indicated that total savings of up to $1 per sq ft have resulted from the use of this method. This is without considering savings due to the elimination of plaster ceilings and reduction of floor to floor heights.

"Shaped Beams in Bridge Design"—Edgar Gilbert, design engineer, Department of Public Works, Province of Quebec, Montreal

The reduction of bridge cost becomes imperative in any highway program. The solution seems to be elimination of piers and the lengthening of spans. This, however, presents the problem of the rate of increase of dead load and maximum stresses developed in the structure as the spans are increased. The problem—for beam-and-girder bridges—can be solved by reduction and elimination of all non-essential parts of concrete. The rectangular beam then becomes a shaped beam.

TIME OUT—Relaxing briefly at 4-day technical meeting are L. A. Gottheil (left), inspection trip committee member, and D. O. Robinson, Toronto representative

This reduction in weight leads to the use of higher stresses in concrete, therefore requiring a concrete mixture of high quality. It does mean that the knowledge of concrete properties is of prime importance in the design of shaped-beam bridges.

For dimensions of a shaped beam, the shear controls the web thickness and the flange dimensions are determined by the maximum steel reinforcement required. All along the span, the flange section will be constant for single beams and increased near the intermediate supports for continuous haunched beams in consideration of higher compressive stresses. The web thickness in the beams is variable and adjusted according to the shearing stress. Flange dimensions are also controlled by the economy and number of beams.

To achieve a rigid and economical bridge, the spacing between shaped longitudinal beams may vary from 7 ft to 8 ft 6 in., the

longer the span, the greater the spacing. The transverse beams must be rigid, in sufficient number to insure the interdependence of longitudinal beams, and be as light as possible to have a span with minimum weight. Recommended spacing varies from three to five times the depth of longitudinal beams. It increases with the span.

In the design of shaped beams secondary stresses developed by shrinkage, creep or plastic flow, bond, and shear also have to be taken into account.

The construction of shaped beams requires special methods and special care. Also, since all parts of the beam are stressed, a 4000-psi concrete of high quality is preferred.

Session No. 3

The Thursday morning session was under the chairmanship of Prof. J. L. De Stein, Department of Civil Engineering, McGill University. Topics included testing with the impact hammer, prestressed concrete beam tests, and two papers about construction on the St. Lawrence Seaway.

"Calibration and Use of Schmidt Impact Hammer"—N. G. Zoldners, concrete control engineer, Mount Royal Paving & Supplies, Ltd., Montreal

Most concrete technicians are familiar with the old "hammer test" in which the quality of the concrete in a structural part was judged by tone and rebound when struck by a hammer. Ernst Schmidt, a Swiss engineer, introduced in 1948 a test hammer which is based on empirical relationships between the strength of concrete and rebound of a steel plunger, derived for a particular set of limiting conditions. Each test hammer as bought is supplied with a calibration chart showing the relationship between the impact rebound number and probable concrete compressive strength. This chart can be used only when material and testing conditions are similar to those in effect when calibration of the instrument was carried out. Each test hammer has to be calibrated for use on concrete made with aggregates produced from a specific source. Also, because of the variation in manufacture, a separate calibration chart is needed for each hammer.

The main advantage of the Schmidt hammer is its handy use under field conditions. However a reliable interpretation of impact rebound readings demands competent determination of factors to be taken into account in the field testing of concrete structures. It has been found that the impact test hammer rebound readings determine strength of concrete within a limit of ± 15 percent.

It is recommended that the test hammer be used only on surfaces where concrete was cast against a form. Rebound readings on finished floors or rough floated surfaces will not give a true picture of the quality of concrete in the structure itself.

It is advisable to take 15 readings from one locality. Obviously erroneous readings due to hitting stone, air pockets, or honeycomb behind an apparently sound surface should not be taken into account. The instrument, of course, has to be held correctly to give proper readings.

If the concrete specimen is small, such as a thin wall or beam, the elastic deformations of the mass will lower the rebound readings.

The test hammer is normally calibrated in a horizontal direction. In testing downward or upward the rebound is affected by the acceleration due to gravitational forces and proper account must be taken of these forces.

Rebound readings vary with age of concrete and between dry and damp conditions. The different moisture conditions of concrete in structures are responsible for most of the inconsistency of impact rebound readings.

Although the test hammer provides a simple, inexpensive method of nondestructive testing of concrete in place, it can not substitute for standard methods of compression tests. Its accuracy is sufficient to determine probable strength limits of the concrete in the structure and to detect low strength batches provided it is calibrated properly and used competently.

"Flexural and Shear Tests on a Prestressed Concrete I-Beam"—R. H. Banks, Pre-Compressed Concrete Engineering Co., Ltd., Montreal, and G. A. Jacobson, Aluminium Laboratories, Ltd., Montreal

An 18-ft concrete I-beam was constructed and prestressed under controlled conditions

at McGill University. The concrete and steel stresses were measured with electric strain gages and compared to theoretical values. Deflections of the beam due to prestress and flexure loading were measured and compared to calculated values.

The test beam was loaded to failure under a high shear load. Tension cracks and failure lines were much flatter than those usually found in reinforced concrete. General agreement was established between the method of failure and failure lines indicated by the Mohr theory of rupture.

Considerable experimental work has dealt with the ultimate and working load conditions of prestressed concrete members. These tests have verified the calculated deflections and the expected safety factors against cracking and failure. Object of the present experiment was more concerned with the internal effects on a prestressed member.

Generally for cycles of loading up to the design load a straight-line deflection curve was obtained with an ultimate recovery of more than 95 percent. For loads beyond the design load there was a sharp deviation from the tangent slope, but excellent elastic recovery and low residual deflection.

Since relatively little information is available about web stresses in I-beam sections, it was thought advantageous to investigate stress conditions in the web of the test beam at ultimate shear loads combined with flexural bending.

The inclination of diagonal tension cracks governs the spacing of stirrups. At present there is some disagreement between designers as to the inclination of diagonal tension failure planes to be used in stirrup design.

An attempt was made to predict the probable inclination of diagonal tension cracks by the Mohr theory of rupture. According to this theory failure in a homogeneous material would not occur at a plane perpendicular to the direction of principal stress but along a slip plane inclined somewhat steeper than the direction of principal stress. This inclination can be calculated knowing the tensile and compressive strength of concrete. The expected inclination of failure planes diagonally across the beam was determined as 32 deg to the horizontal. Actual inclination of the diagonal cracks across the beam on failure came close to this value.

Total shear across the end panel amounted to 50 kips on failure which was 2½ times the design shear. This seems to indicate that the concrete section is capable of withstanding considerable shear in addition to shear resisted by stirrups.

The behavior of the prestressed beam indicated that present methods of design will produce structural members with an adequate factor of safety against failure. The test also indicated that the deflection characteristics of a prestressed beam will insure adequate warning against accidental overload and good recovery characteristics.

"Selection of Concrete Aggregates for the St. Lawrence Seaway Locks"—

J. C. Kingston, concrete control engineer, The St. Lawrence Seaway Authority, Montreal

The work now being undertaken on the St. Lawrence Seaway consists of many millions of cubic yards of dredging, excavation, and dike construction, as well as the building of seven locks, two by the St. Lawrence Seaway Development Corp. in the United States and five by the St. Lawrence Seaway Authority in Canada. For these latter locks concrete work is being carried out in three separate construction areas: the lock at Iroquois, Ontario, about 110 miles upstream from Montreal; two locks at Beauharnois, about 26 miles upstream from Montreal; and two locks in the Montreal area, one at the head of the Laprairie Basin called the Côte Ste. Catherine Lock and one at the foot of that basin called the St. Lambert Lock.

A deposit of good natural sand and gravel was located about 2 miles from the Iroquois lock site where a quarry and necessary plant have been installed.

The main items of equipment at this site for the production of coarse aggregate are a 25 x 40-in. portable jaw crusher, two 4-ft standard cones, and two triple-deck 4 x 12-ft screens along with the necessary bins, conveyors, etc. In the sand plant, a 600-ton silo can be fed varying amounts of any of the material produced by the coarse aggregate plant. The silo discharges onto a 4 x 10-ft double-deck screen located over an air

separator. The materials scalped off the decks of this screen can be fed in varying proportions to a 4-ft shorthead cone and a 22 x 40-in. set of rolls which operate in parallel and discharge back over the double-deck screen. Material passing the lower deck of this screen passes through the air classifier where the dust is drawn off and from which sand is delivered to stockpiles. Although constant control and many adjustments of feed are required this unit has produced aggregates which meet specifications.

For the St. Lambert Lock and the Côte Ste. Catherine Lock it was originally intended to use the large tonnages of rock excavation as the source of concrete aggregate. However this rock was rejected as concrete aggregate and fine and coarse aggregate are being supplied by three producers in the Montreal area.

At Beauharnois the excavation for the two lock structures and connecting channel is in rock composed of about 98 percent quartz with minor amounts of feldspar, pyrite, calcite, and clayey material. The coarse and fine aggregates will be produced from the rubble to be excavated. The plant, which has just started operation, includes a 48 x 60-in jaw crusher, a 5½-ft standard cone, a 4½-ft standard cone, two 4-ft shorthead cones, one 5 x 12-ft double-deck screen, and two 5 x 14-ft single-deck screens, along with the necessary conveyors, stackers, reclaiming tunnels, and bins. The equipment is laid out with a minimum of complexities and is versatile or flexible enough to make aggregate gradation adjustments a simple matter.

"Concrete Control on St. Lawrence Power Project—Power Authority of the State of New York"—Ellis L. Armstrong and Harry H. McLean, assistant project manager and concrete engineer, respectively, Uhl, Hall & Rich, Massena, N. Y.

Of the structures currently being constructed by the Power Authority of the State of New York, the four main concrete structures, with a combined volume of 1,915,000 cu yd of concrete, are supplied with aggregates from one source by one producer. This major portion of the power authority work extends along 32 miles of the St. Lawrence river.

Due to the complex stage-scheduling which affects all structures in similar ways, and at the same time, as the river diversion is shifted back and forth, peak demand for concrete aggregates for each structure occurs at the same time of the year. For this reason capacity requirement for the aggregate plant is unusually high. The aggregate source is a deposit of dolomite from which material is quarried for the manufacture of both coarse aggregate and sand.

To meet the high-rate-demand-requirement, the aggregate contractor installed a plant constructed around a 53 x 60-in. primary impact crusher. The entire plant is arranged in three stages—primary, secondary and tertiary—and any one stage can be operated independently of the other two. The plant is extremely flexible.

All reduction facilities are accompanied by closed circuits. The primary screening tower has facilities to reduce the oversize by use of a jaw crusher. It has facilities to reduce 6-in. cobbles by use of a triple roll crusher.

The secondary unit has two reduction facilities, a double roll crusher and a cone crusher. These units are connected to the tertiary so that ¾-in. material may be returned and reduced in this circuit.

The tertiary unit, which scalps off the ¾-in. material and produces sand, consists of an 8-ft x 12-in. rod mill and a 54-in. Gyradisc crusher. A natural sand, about 20 percent of the total, is added in this circuit to supplement the manufactured sand, making up for deficiencies of some fractions. Gradation is controlled by a water scalping tank.

The concrete plants for all structures are automatic. One feature required by specifications is that all plants be equipped with a finish screen on the top of the plant at the end of the conveyor belt and in addition, all aggregate, except sand and ¾-in., must pass a rinsing screen at the bottom of the same belt. The rinsing screen and finish screen contribute greatly to uniformity in concrete control. If both screens are of adequate capacity and suitable design they provide a means for correcting all the usual faults from the result of stockpile degradation and contamination.

In anticipation of moisture control difficulties, all plants are equipped with a moisture control meter in the sand batchers.

Some winter construction has been necessary. To maintain completion dates on Iroquois Dam, it was found necessary to place concrete all winter on the concrete apron downstream from the dam. In this case most of the concrete was starting from foundation rock and the block sizes were the same 60 x 100 ft. The enclosure, constructed of 10 x 20-ft panels composed of 2 x 2-in. lumber with canvass on each side, allowed work to be carried on in 70-deg temperatures. Heating units for each covered block were forced air butane gas heaters with a capacity of 1,500,000 Btu.

Some heating was done at Long Sault Dam where it was necessary to work into the winter to raise the blocks to certain elevations to maintain schedules. The contractor elected to use insulation blankets 1 in. thick for protection of the blocks. By laying the insulation blanket on the block surface and using insulated side forms, the concrete surface temperature was maintained close to that of the internal temperature of the blocks. The blankets and forms were left in place all winter so that the temperature of the concrete surfaces were reduced gradually.

Session No. 4

The final session was a symposium on winter concreting. It featured four short presentations by panel members and then a question and answer period with audience participation.

Session chairman was R. P. Fleming, architect, Montreal. Panel moderator was R. E. Heartz, president, The Shawinigan Engineering Co., Ltd., Montreal. Panel members were Herbert K. Cook, director of engineering, Master Builders Research Laboratories, Cleveland; E. G. Swenson, research officer in charge of cement and concrete research, Division of Building Research, National Research Council (Canada), Ottawa; Samuel D. Burks, product manager, Construction Specialities Division, Dewey and Almy Chemical Co., Cambridge, Mass.; H. John Racey, executive vice-president, Racey, MacCallum & Associates, Ltd., Montreal; and L. H. Tuthill, concrete engineer, Division of Design and Construction, California State Department of Water Resources, Sacramento.

Review of ACI 604-56—Herbert K. Cook

A brief review of the contents of the ACI Standard "Recommended Practice for Winter Concreting (ACI 604-56)."

It has been determined that air entrainment and 1 percent calcium chloride will permit considerable reduction in the required length of protection, and hence the costs of protection are correspondingly reduced.

Mr. Cook emphasized the report's recommendation that "plans to protect fresh concrete from freezing and to maintain temperatures not less than the permissible minimum during the first few days after placing should be made in advance of expected freezing temperatures. It is too late to begin assembling protective devices and materials after concrete has been placed and the temperature begins to approach the freezing point."

The report recommends that after the first frost and until the mean daily temperature at the job site falls below 40 F for more than 1 day, concrete should be protected from freezing for not less than the first 48 hr. When the mean daily temperature falls below 40 F for more than 1 day, concrete should thereafter be placed at a temperature not lower than 55 F for concrete containing ¾-in. aggregate; 50 F for 1½-in. aggregate; and 45 and 40 F for mass concrete containing 3- or 6-in. aggregate, respectively. These minimum temperatures should be maintained for at least the first 3 days. During the next 3 days it should be protected from freezing. When the mean daily temperature rises above 40 F for more than 3 successive days, placement and maintenance of concrete for 3 days at or above required minimum temperatures may be discontinued, but concrete should not be exposed to freezing temperature for at least 40 hr after placing.

These are minimum requirements for air-entrained concrete. Further protection is obtained by the use of 1 percent of calcium chloride.

One section of the report deals with recommendations for minimum placing temperatures and procedures for obtaining them.

The section on winter protection and curing methods recommends that favorable curing conditions be maintained. High temperatures and dry heating should be avoided,

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particularly where floor finishes are involved. Heating and curing by exhaust steam is preferred but the enclosure must be kept enclosed to avoid icing and consequent overloading. Curing with sealing compounds is acceptable but it is usually more practical to cure with water or exhaust steam and to apply the sealing compound after protection is removed.

Preparation before concreting is of utmost importance. Before any concrete is placed, completely remove all ice, snow and frost, and raise the temperature of all surfaces the concrete will contact above the freezing point.

Since during the first 3 days most of the heat of hydration of the cement is developed, no heat from outside sources is required if this heat in the concrete is suitably conserved. This can be done by use of insulating blankets on unformed surfaces and by insulated forms where repeated re-use of forms is possible. The amount of insulation necessary for good protection can be determined from ACI 604-56 for various kinds of concrete work and for several degrees of expected severity in weather.

Mr. Cook then showed pictures of actual job uses of several types of insulation, noting that in all cases concrete temperatures were maintained above 40 F for the first 3 days and that air temperatures in some instances were as low as −10 F.

One slide showed heavy re-usable forms backed up with 2-in. Rockwool bats on 3-in. wood sheathing on a dam spillway. Another slide showed the use of 1 in. thick insulating blankets on a 3 in. thick canal lining. Other slides showed the use of wood planer shavings spread 6 in. thick on horizontal construction joints and used to fill forms. The use of 1 in. thick Fiberglass blankets was also illustrated.

On many jobs it will be desired to practice the minimum protection which barely averts surface damage to the concrete. Minimum requirements for jobs taking maximum risk as presented in ACI 604-56 were then reviewed.

Winter concreting in Europe—E. G. Swenson

A review of trends in winter concreting in Europe. In Europe special efforts are made to encourage and promote winter construction. Research on winter concreting has been pursued intensively through the help of state funds, particularly in the Scandavanian countries.

The primary concern has been the added costs of winter work and this has directed investigations into developing methods for increasing the frost resistance of concrete and for determining the minimum protection requirements. Progress has been made in developing quantitative methods for predicting the maturity of the concrete, taking into account the material properties and the geometry of the elements, but only for variations in outside temperature conditions. The influences of the different climatic elements and factors have received little attention.

Considerable progress has been made through laboratory experiments in the determination of the frost resistance of "green" concrete and of the factors which influence this resistance. It is now possible to estimate the degree of hardening of concrete under various temperature conditions. Acceptable theories for concrete deterioration due to freezing and for resistance to frost damage have been developed and provide a much clearer understanding of the problems involved in winter concreting.

Freezing of the plastic concrete before it has begun to set does no ultimate damage providing subsequent curing conditions are favorable. A certain "prehardening" time is required, however, before the green concrete can be subjected to below freezing temperatures without damage. This period ranges from 24 to 72 hr under normal conditions, and is influenced by proportioning, cement type, accelerators, and entrained air.

The application to field practice of the time-temperature function based on the maturity concept is generally successful. Of the several methods proposed there is considerable uncertainty in their application to hardening at below freezing temperature. It is, nevertheless, possible to estimate the degree of hardening of concrete under various conditions and to determine the time when the concrete has obtained frost resistance and the time when forms can safely be removed. The Danish National Institute for building research has incorporated this concept into an empirical field method which makes it possible to calculate the time required to attain a certain degree of hydration.

The development in the U.S.S.R. of the so-called "cold" concrete method is of special interest. From available information the following description can be given. A mixture of calcium and sodium chlorides, up to 20 percent by weight of the mixing water, is incorporated in the concrete. The concrete is claimed to harden satisfactorily at mix temperatures down to −10 C. It is necessary to maintain the temperature for the first 10 days above the freezing point of salt solution in the mix. It is claimed that in 90 days such concretes develop 90 to 100 percent of the strength of normally cured 28-day concrete.

Some countries provide qualitative specifications for winter concreting which cover (1) methods of protection for various arbitrarily selected outside temperature ranges, (2) methods of insulation and utilization of heat of hydration of the cement, (3) selection of suitable cement type, (4) use of admixtures, and (5) types of enclosures and methods of heating them.

Enclosures are considered too expensive to employ in most winter concrete work and are generally restricted to special structures and elements. Unless continuation of work is urgent, some recommendations suggest that concreting be stopped when temperatures fall below −10 or −15 C rather than allow for the use of full enclosure as in North America.

As far as possible the same heat source is used for heating aggregate and water as for heating the concrete. Centralized heating systems are used extensively. Infra-red radiation heaters have been employed. Electro-curing has been developed and used successfully in Switzerland, but the higher cost has prevented any extensive use of this method.

Considerable attention is now being given in Europe to the suitability of structures for winter construction. For instance, in Finland buildings with masonry supporting walls and reinforced concrete floors are often not considered for winter construction. This is largely due to the "mixed character" of the work involved which can complicate protective measures. Buildings with supporting concrete partition walls and reinforced concrete floors are simpler and easier to rationalize from the point of view of winter construction and protection. Reinforced skeleton frame structures are also favored in Finland with brick work or precast wall sections put up under more favorable conditions.

A large proportion of apartment buildings in Sweden are built with exterior walls of concrete with outside insulation of cellular concrete. The precast cellular concrete slabs are placed as outside insulation and bonded to the inner monolithic load-bearing concrete. During placing of the concrete the cellular slabs serve as the outside formwork. Winter protection for such structures is relatively simple. And, of course, prefabricated concrete elements are used widely in winter work in Europe.

Winter methods for mass concrete—Samuel D. Burks

Winter concreting methods for mass concrete have the same basic objectives as for structural concrete operations. These are: (1) protection of aggregates, (2) control of initial concrete temperature, and (3) protection of the concrete after it has been placed. Mass concrete has two major distinctions which set it apart somewhat from structural concrete insofar as winter concreting is concerned. These are: (1) the degree of protection required for mass concrete is somewhat complicated by the influences of heat of hydration, and (2) the need for early strength development in mass concrete is not so critical as in structural concrete.

Mr. Burks discussed ACI 604-56 as applied to mass concrete and also briefly discussed the influence of protection insofar as volume change and cracking from heat of hydration are concerned.

Intelligent planning for winter concreting requires in some degree a knowledge of local weather. Records of local weather stations will show the mean monthly air temperature, mean maximum daily temperature, mean minimum daily temperature, the number of days the temperature fell below freezing, precipitation in the form of rain or snow, and other pertinent information. This weather history does not guarantee that the ensuing winter will conform to a fixed pattern, but such records will show a definite trend of what one might expect even if not of precise magnitude and severity.

Not only is broad seasonal planning necessary for good winter concreting practices

but so is day-to-day planning. This means protection equipment and plant must be maintained in ready and efficient operating conditions, and, if necessary, critical construction schedules can be temporarily curtailed due to limited facilities to protect the concrete.

In general, ACI 604-56 recommends that the initial placing temperature for mass concrete be 10 to 15 deg lower than for structural concrete. Mass concrete because of its size usually contributes some of its own heat toward protection through heat of hydration. The heat generated by hydration of the cement is a condition experienced in mass concrete during all seasons. During summer months the primary purpose is to control the generation of internal heat of the structure so that as it cools over the years the volume change will not be large enough to cause cracking.

When mass concrete is placed during cold weather, peak internal concrete temperatures must be controlled with much the same point of view except the primary motive is to prevent or to minimize sharp reversals of temperature and volume change which can result in structural cracking.

Winter concreting of buildings—H. John Racey

Mr. Racey discussed winter concreting with particular reference to building structures and illustrated what can and does happen to those who take chances and do not follow recommended practices for winter concreting.

He illustrated various failures and structural defects due to improper protection, curing, and construction techniques. One roof slab failed because the freshly placed concrete was not protected from freezing. After the shoring and formwork were removed there was a thaw and the slab collapsed. He indicated that in some instances frozen concrete could be salvaged. Tests made on portions of the collapsed roof slab concrete after proper curing showed compressive strengths of more than 3000 psi.

He also showed several examples of poor construction practice, where contractors neglected to clean snow out of the forms before placing concrete. This resulted in cases of honeycombing, serious settlement, and damage to supporting reinforced concrete beams.

Another case illustrated the contractor's failure to thaw the subgrade under footings and when the ground thawed the wall and footing settled and cracked.

Mr. Racey emphasized that proper planning and adherence to recommended winter concreting methods would have resulted in satisfactory structures.

Inspection trips

The final two days of the Montreal meeting were devoted to inspection trips. Friday morning found a large group inspecting the Montreal section of the St. Lawrence Seaway. The full day on Saturday was also devoted to the Seaway with the group inspecting the International Section at Beauharnois, about 26 miles upstream from Montreal.

The St. Lawrence Seaway, when completed, will consist of a series of dikes, channels, and locks extending from Montreal Harbor to Sault Ste. Marie. The system will enable trans-ocean vessels 720 ft long, with 76-ft beam and 25-ft draft, to enter the upper St. Lawrence and Great Lakes.

The work being undertaken consists of many millions of cubic yards of dredging, excavation, and dike construction. It also includes the building of seven locks, two by the St. Lawrence Seaway Development Corp. in the United States and five by the St. Lawrence Seaway Authority in Canada.

The inspection trips were to the sites of four of these Canadian locks. Two locks are being constructed at Beauharnois. Two locks are being constructed in the Montreal area—one at the head of the Laprairie Basin called the Côte Ste. Catherine Lock and one at the foot of the basin called the St. Lambert Lock.

On the afternoon of October 26, four plants opened their facilities to tours: Canada Cement Co., Ltd.; Miron & Frères, Ltée.; Mount Royal Paving & Supplies, Ltd.; and Siporex Ltd.

Canada Cement plant No. 1, Montreal East, has an annual productive capacity of 7,500,000 bbl. It is a wet process plant and has six kilns. The tour covered rock crushing and storage facilities, slurry mixing in the raw mill department, correcting tanks and

slurry mixing basins, the rotary kilns and coolers, clinker storage, finishing mill, and bagging operations.

Miron & Frères, Ltée., has on one site, covering more than a square mile, quarries and crushing plants, manufactured sand and expanded aggregate (perlite) plants, central mix and asphalt plants, concrete block and pipe plants. The ready-mixed concrete plant has one of the world's largest central mix installations—12 cu yd Worthington 252-S. The new semi-automatic block plant consists of six Bergen machines. The maintenance and repair shop, 600 x 250 ft, is designed and equipped to service the plant installations and more than 500 mobile units. The latter includes the fleets of concrete agitator trucks and excavation trucks, 32-ton quarry trucks and power shovels, cranes and bulldozers, pavers, rollers, and graders.

Mount Royal Paving & Supplies, Ltd., has one of the most modern crushing and screening plants in North America, capable of producing in excess of 1500 tons per hr of accurately sized specification limestone. At the same site, the premixed concrete operation, complete with quality control laboratory, has a production potential of 6000 cu yd of concrete per day and is serviced by more than 100 mixer trucks. There are also two asphalt plants to supply the company's contract division and extensive and modern maintenance shops.

The Siporex Ltd. plant at Delson manufactures autoclaved cellular concrete. The material is manufactured in the form of precast reinforced lintels and unreinforced masonry units. The process involves portland cement, finely ground sand, and aluminum powder together with certain chemicals to regulate the rise and set of the material. The plant went into operation in February, 1955, and now has a capacity of 120,000 cu yd per year.

Social events

The main social function was a banquet at which Raymond Brunet, owner of Ed Brunet & Son, general contractors, Hull, Que., was guest speaker. Mr. Brunet, who has had a distinguished civil and military career in Canada, discussed the construction "boom" in Canada. Gerald Milsom, chairman of the ACI Montreal committee presided as toastmaster. Gerard Niding, Acting Mayor of Montreal, welcomed ACI to the host city. Frank Kerekes, ACI president, thanked Montreal for its hospitality.

The ladies' program during the 4-day meeting included tours of the city and coffee hours.

Regional meeting committee

Gerald Milsom, president, Metallicrete Floor Co., Ltd., was general chairman for the event. D. F. Nash, sales manager, Dewey and Almy Chemical Co. of Canada, Ltd., was secretary; G. R. Rinfret, chief engineer and vice-president, The Shawinigan Engineering Co., Ltd., was treasurer. The technical program was under the direction of M. F. MacNaughton, vice-president, Mount Royal Paving & Supplies, Ltd.

S. E. Acker

H. Isabelle

Other committee assignments were: registration and entertainment—James H. Royds, Drew Brown, Ltd., and G. J. MacHutchin, Diamond Flooring, Ltd.; publicity—R. O. Beauchemin, Beauchemin-Beaton-Lapointe, Consulting Engineers, and H. Isabelle, Canada Cement Co., Ltd.; inspection trips—H. Fred Senez, Mount Royal Paving & Supplies, Ltd., and L. A. Gottheil, Miron & Frères, Ltée.; membership promotion—S. E. Acker, Creaghan & Archibald, Ltd.; educational—J. F. Brett, consulting engineer; finance—H. C. Pearson, Dewey and Almy Chemical Co. of Canada, Ltd., and E. P. Hersey, Warnock-Hersey Co., Ltd.; ladies committee—Byron T. Kerr, Warnock-Hersey Co., Ltd.; P.Q.A.A. representative—Colin H. Copeman; E.I.C. representative—E. R. Smallhorn, consulting engineer; Quebec representative—P. A. Dupuis and E. Gilbert, Quebec Department of Public Works; Ottawa repre-

sentative—J. W. Lucas, Ottawa Department of Public Works; Toronto representative—D. O. Robinson, Canada Cement Co., Ltd.

General committee members were S. L. Burns, Donald Inspection, Ltd.; L. H. Burpee, St. Lawrence Seaway Authority; A. L. Campbell, Canada Cement Co., Ltd.; G. A. Campbell, Pentagon Construction Co., Ltd.; R. M. Doull, Preload Co. of Canada; W. McG. Gardner, Montreal Transportation Commission; W. Griesbach, Foundation Co. of Canada, Ltd.; L. B. McCurdy, Dominion Structural Steel, Ltd.; and W. L. Pugh, Aluminum Co. of Canada, Ltd.

Ladies committee

The ladies committee was under the chairmanship of Mrs. Byron T. Kerr. Members were Mrs. R. O. Beauchemin, Mrs. L. A. Gottheil, Mrs. E. P. Hersey, Mrs. M. F. MacNaughton, Mrs. I. D. MacKenzie, Mrs. D. F. Nash, Mrs. G. R. Rinfret, and Mrs. James H. Royds.

F-SHAPED AIRPORT

. . . in Puerto Rico

PUERTO RICO'S International Airport terminal makes sparkling use of concrete to resist earthquake and hurricane stresses while providing sculptural background for air-minded traffic.

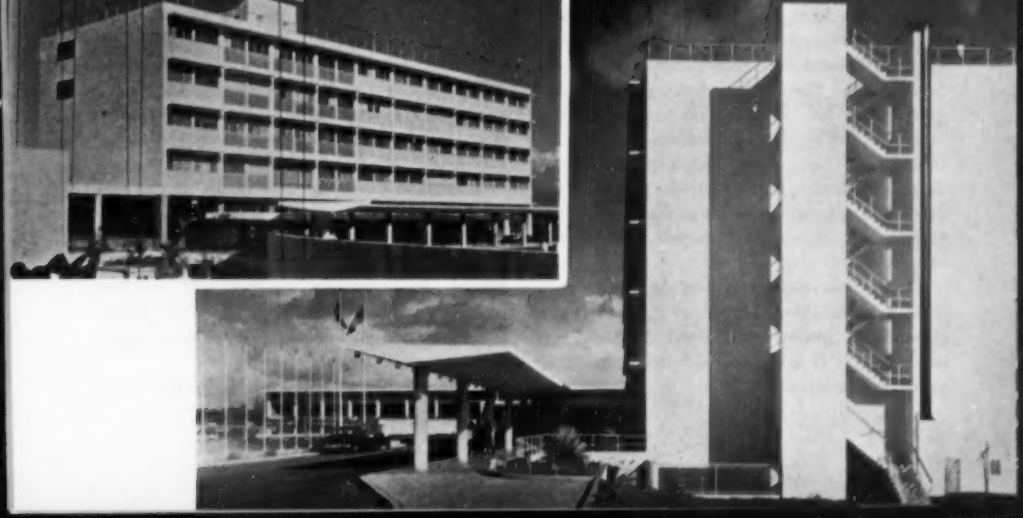
Fresh, imaginative F-shaped design, originated by a team under architect Walther Prokosch, emphasizes exposed concrete as an element of architecture.

Terminal building was constructed for a modest $15.30 per sq ft, yet is reported to surpass more expensive airports in efficiency, accommodations, and effective use of the outdoors.

Inset shows clean-cut frame of office block in reinforced concrete, enlivened with spandrels of gray stucco and blue-green tile. Thin, cantilevered slabs shade windows of the air-conditioned block.

Lower picture gives over-all view of stair tower at exit end of central office block. Pedestrian tunnel, located under road, leads to sunken parking lot. Spray pond, lighted at night, has functional purpose of being "cooling tower" for air-conditioning system.

Architects and engineers: Tippetts-Abbett-McCarthy-Stratton. Consulting architects: Toro-Ferrer & Torregrosa. General contractor: Carribean Enterprises Corp.



Partial view of the new military buildings at Ft. Meade shows exposed aggregate panels being used in curtain wall construction

PRECAST PANELS

Speed Military Job

When completed in 1957, the military building at Fort Meade, Md., will be faced with 87,000 sq ft of precast insulated concrete wall panels. In construction, the panels, faced with Cardiff greenstone and royal greenstone, are mounted on support angles bolted to the reinforced concrete frame of the building. The average panel measures 6 ft 6 in. in width. These panels combine the luxurious appearance of stone facing with the speed and economy of panel curtain wall construction.

The panels consist of two layers of concrete 1¾ in. thick, separated by 1½ in. of glass fiber insulation. Heat transmission coefficient U is 0.14, and the panels serve as acoustic insulators as well.

Structurally, the sections are designed to carry their own weight plus the weight of the windows they support. In addition, they are reinforced laterally to withstand winds up to 100 mph. To make each panel work as a unit, the two concrete shells enclosing the insulation material are connected by a series of expanded metal channel-shaped shear ties.

The panels are cast face down at the factory, and it is important to prevent segregation of facing material. For this reason, the concrete is deposited first in wheelbarrows placed close to the batches. It is then wheeled to the forms where it is gently placed by hand shovels and padded down with a mason's trowel.

After ½ hr, a pre-assembled reinforcing

FIRE RESISTANCE

Permalite plaster*, used to fireproof structural steel members, gains 4-hour fire-ratings in

REPUBLIC NATIONAL BANK BUILDING
Dallas, Texas

STATE OFFICE BUILDING
Pittsburgh, Penna.

(and many other noted buildings)

Nationwide—noted buildings gain many advantages with

Permalite®

the world's largest selling Perlite aggregate

for **BETTER PLASTER**
BETTER CONCRETE

LIGHT WEIGHT

Permalite plaster*, only ½ the weight of sanded plaster, provided excellent workability, low moisture absorption and low suction ratio in the plastering of many outstanding buildings such as:

HOTEL FONTAINEBLEAU
Miami Beach, Florida

NAZARETH CHILD CARE CENTER
Boston, Mass.

INSULATION

Permalite, used either in insulating concrete or in roof or floor fill, gives highly desirable "K" and "U" factors in all types of buildings, from homes to warehouses.

examples

S. S. KRESGE CO. WAREHOUSE
(450,000 ft.² roof deck of Permalite lightweight insulating concrete*)
Fort Wayne, Indiana

PERSONAL RESIDENCE OF DESIGNER CLIFF MAY
(Permalite insulating concrete* fill over 7,000 ft.² floor slab)
Los Angeles, Calif.

the terms

*"Permalite plaster" or "Permalite concrete" mean plaster or concrete in which Permalite expanded perlite is used as the aggregate.

Write for information on the many advantages of Permalite in modern construction

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GREAT LAKES CARBON CORPORATION
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When you need reinforcing steel, it's a good idea to check with Bethlehem. For not only do we have the facilities to bend, cut, and shape bars to your satisfaction—we can also save you time by making quick delivery.

This is because we have ten completely equipped bar fabricating shops, conveniently located throughout the country. Wherever bars are required, there's a Bethlehem shop within economical shipping distance, ready to be of service to you.

Bethlehem Reinforcing Bars are just the bars you want, too. They're made from new-billet steel. They have deformations which meet ASTM Specification A-305. They come in all sizes from Numbers 3 to 11, inclusive. Bethlehem Reinforcing Bars are cut to length and bent in our bar fabricating shops, and reach the job bundled and tagged, with bar lists included.

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BETHLEHEM STEEL

BETHLEHEM STEEL

basket is placed in the mold. Following this, the workers deposit the first layer of structural backup concrete. Since this mix has considerably less slump than the facing mix it is deposited in the forms by a crane bucket.

Next, glass fiber insulation sheets, precut to fit between the expanded metal shear ties, go into place following leveling off of the concrete. Finally, the top layer of mesh reinforcing is wired to the reinforcing basket, and the second layer of structural back-up concrete is spread, screened, and floated.

Pneumatic vibrators fastened to the underside of the steel forms consolidate the different layers of concrete, using care not to over-vibrate the concrete to prevent segregation as well as to preclude affecting the water-cement ratio by producing water gains in the forms.

After 24 hr the panels are picked up from the casting floor by an overhead crane and carried to the processing area where they are set down nearly vertically against a pair of A-frames. Equipped with electric sanding machines and wire brushes, the processing crew first sand the panels to remove the surface film of cement formed in the casting mold, then brushes them to expose aggregate.

An acid wash is next used to clean the aggregates and bring out the color and lustre of the stones. Care has to be taken that none of the matrix is eaten away by this process since the panel color might be affected. Compared to the stones, the matrix is light in color, so if the stone relief is deepened, the color of the panel will also deepen.

Shortly after the washer completes acid swabbing the panel, a hose man washes away all traces of the acid. Besides cleaning the panel, the hosing constitutes part of the wet-curing process.

The panels are then covered with saturated burlap and paper, and thermostats set at 70 F to control the temperature. After 15 to 20 hr of curing, the panels are moved to another location in the factory where they are kept wet on both sides for 4 days.

After shop curing, the panels are taken to a yard where they are stored 3 weeks longer. In the summer the panels are draped in sheets of muslin to keep them from drying out too quickly, and in winter they are covered with heavy tarpaulin to protect them against the possibility of thermal shocks.

More than 1100 exposed aggregate wall panels like these are being used at Ft. Meade, Md. Green aggregate is used advantageously with all white matrix

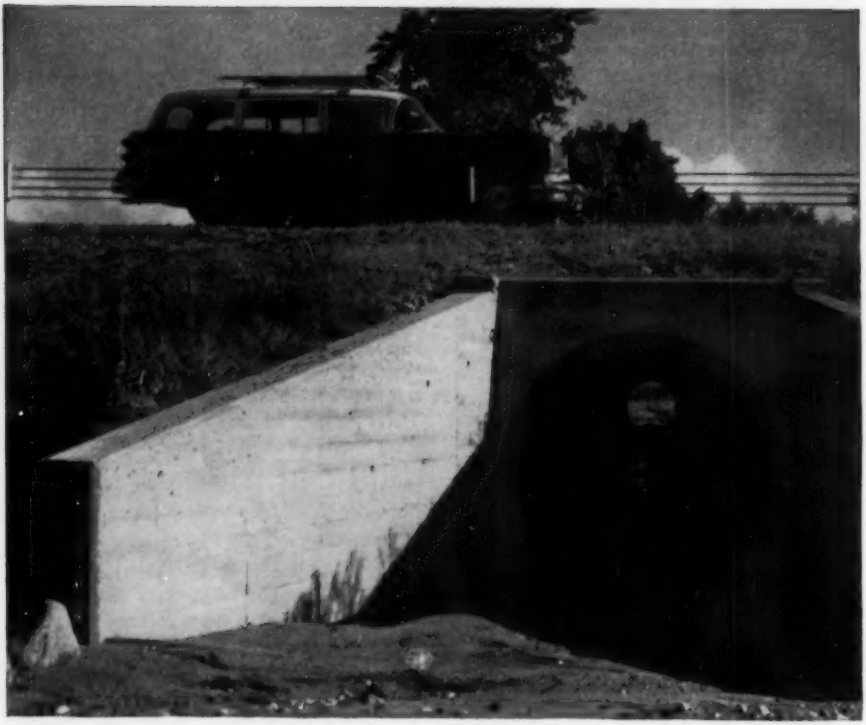
Construction specifications require a minimum strength of 1200 psi before side forms can be removed and the panels handled. Any translation or rotation of the panels without the support of the steel forms is accomplished in a vertical or near-vertical plane.

For their quick trip to the job site, the panels are placed on trailers and trucked. At the site, a mobile crane picks up the panels and sets them in place, where they are attached to angles on the face of the columns. The angles are bolted to wedge inserts set by the concrete contractor at the time he concretes the columns. Average erection time per panel is 10 min.

The Ft. Meade building is being constructed for the government under the supervision of the Corps of Engineers, U. S. Army, Baltimore District. Architects for the paneled structure are Reisner and Urbahn of New York. Anderson-Nichols and Co., Boston, are the engineers, and construction is a joint venture of general contractors Chas. H. Tompkins Co., Washington, D. C., and J. A. Jones Construction Co., Charlotte, N. C. Panels for the project are being furnished by the Marietta Concrete Corp. from a branch plant at Baltimore, in cooperation with the John J. Earley Studios, Rosslyn, Va.

Highly Stressed Concrete

when reinforced with



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Lasts Longer
American Welded Wire Fabric

ON THE INDIANA TOLL ROAD, opened this month, concrete reinforced with Welded Wire fabric makes a better road. In culvert pipe, and in the road itself, wire fabric gives the concrete extra strength and durability. You will find American Highway Guard, and specially designed American Road Joints, as well as American Welded Wire Fabric, doing an excellent job on this new road.
USS

Concrete roads, floor slabs, pipe, walls, sidewalks—all are improved with Welded Wire Fabric reinforcement. They have greater resistance to cracking, last longer, and stay smoother. And now, for concrete that must withstand unusually high stresses, American Welded Wire Fabric comes in larger sizes than formerly. It's now available in diameters up to and including ½", at 2", 3", 4", and 6" on center. It meets ASTM Specification A 185 56T.

The high quality of American Welded Wire Fabric is rigidly controlled from iron mine to you. Made from tough, cold-drawn steel . . . then electrically welded together into a strong network of durable reinforcement, it cuts maintenance cost because it increases service life of concrete. It cuts *installation* costs because it is easily handled and placed. It comes in both sheets and rolls. Send the coupon for helpful literature on this and other construction materials manufactured by American Steel & Wire.

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Please send complete information on the following products:

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- ☐ American Wire and Strand for Prestressed Concrete
- ☐ American Road Joints
- ☐ Multisafty Highway Cable Guard
- ☐ American Beam-type Highway Guard
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City ..... **State** .....

Positions and Projects

Bouvy visits ACI headquarters

J. J. B. J. J. Bouvy, technical director, N. V. Ingenieurs Bureau voor Industrie Service (IBIS), Scheveningen, The Netherlands, recently visited ACI headquarters in Detroit. The Ingenieurs Bureau is particularly active in the field of prestressed concrete construction.

Brig. Gen. Talley joins Raymond

Brig. Gen. B. B. Talley, U. S. Army retired, has been appointed project manager for Raymond Concrete Pile Co. and will direct construction operations in foreign countries. General Talley is a graduate of Georgia School of Technology, Army Engineer School, and National War College. For the past year he has been division engineer, Mediterranean division, Corps of Engineers, with headquarters in French Morocco.

Oregon Portland names traffic manager

Recently appointed traffic manager and sales executive for Oregon Portland Cement Co. was Robert Ornduff, Jr. He previously was associated with the ready-mixed concrete industry in Portland, Ore.

Building code for midwest to be ready soon

A new building code designed to meet requirements and climatic conditions of the midwest states will be issued early in 1957 by the Midwest Conference of Building Officials, Indianapolis, Ind. John V. Gallagher, executive director, stated the code would be available to cities and communities of the midwest states for adoption around January 1. A draft of the new code, as submitted by the committee, was approved by the general membership of the conference at the recent annual meeting. It is to be known as Volume I, Midwest Building Code, with provisions for regulating construction of buildings of all types and occupancies based on minimum requirements.

Thin prestressed slab conquers runway problem

An experimental prestressed slab covering, developed by Southwest Research Institute for San Antonio's International Airport in Texas, has provided an economical answer to warping and cracking of runways.

Airport officials, concerned with heavy aircraft loadings, had two courses of action. One was to remove the old pavement and place new concrete of increased strength to replace it. The alternative was to place overlays on existing pavement to increase the load capacity to the required amount.

Southwest Research scientists tested both thick overlays and a 4-in. prestressed concrete slab on the chief traffic runway. Test results favored the thin slab. Texas Stress Concrete Corp. provided services without profit, as did Prestressing, Inc. Technical research was directed by M. M. Lemcoe, manager of structural research and development at the institute.

Tobin promoted

James Tobin, formerly plant manager at Napa, Calif., for Basalt Rock Co., has been named assistant manager of the firm's structural concrete products division.

Engineering research award announced

Engineering College Research Council of the American Society for Engineering Education has announced plans for the Curtis W. McGraw Research Award to be given for the first time in June, 1957.

The award, in memory of the late Curtis W. McGraw, president of McGraw-Hill Publishing Co., and sponsored by the McGraw-Hill Book Co., will include a cash prize of $1000. Candidates are to be young college men "who have made original contribution in engineering research and who have demonstrated high potential for future leadership." Nominations should reach Dean James R. Cudworth of the University of Alabama, chairman of this year's selection committee, by February 1, 1957.

Elected to concrete industry board

Recently elected as officers of the Concrete Industry Board, Inc., New York, were George F. Pavarini, Pavrini Construction Co., vice-president; William J. McIntosh, Portland Cement Association, secretary; and Dugald J. Cameron, Fireproof Products Co., treasurer. Roger H. Corbetta, Corbetta Construction Co., is the outgoing president.

Rowe named Duke University chairman

Robert Seaman Rowe has been appointed chairman of Duke University's civil engineering department. He formerly was an associate professor in civil engineering at Princeton University.

PCA recognized by safety group

The Portland Cement Association, Chicago, was among 13 associations receiving the National Safety Council's Award for Association Safety Activity during the National Safety Congress recently held in Chicago. The award recognizes outstanding safety activities including publicity, safety contests, publication of safety materials, and cooperation with other agencies. The 1956 contest involved associations representing 20,000 firms.

Granger appointed engineering dean

Armour T. Granger, Knoxville, Tenn., was recently named dean of the college of engineering of the University of Tennessee. He had served as head of the university's civil engineering department before succeeding Nathan W. Dougherty as dean.

Walton for Flaming Gorge Dam

Jean R. Walton has been chosen construction engineer for Flaming Gorge Dam in Utah, one of three construction starts this year on the Colorado River storage project. Selected by the Bureau of Reclamation, Walton recently completed a 2-year mission to Australia where he advised on construction of the Snowy Mountain project.

Honored as "Man of the Year"

Eberle M. Smith, president of the Detroit firm of Eberle M. Smith Associates, Inc., Architects, was named "Man of the Year" at the 13th annual midsummer conference of the Michigan Society of Architects on Mackinac Island.

He was recognized for his outstanding contribution to the design of school buildings and other structures, and for his accomplishments in the field of new developments and methods of construction.

Small Homes Council course slated

Construction of slabs, crawl spaces, and basements will be included in seminar subjects at the University of Illinois Small Homes Council's 12th annual short course in residential construction January 16-17. The 2-day session is conducted annually for builders, architects, contractors, and others in allied building fields.

Reappointed to state board

James A. McCarthy, professor of civil engineering, University of Notre Dame, member of ACI Technical Activities Committee, was recently reappointed by Governor Craig of Indiana for a 4-year term as a member of the State Board of Registration for Professional Engineers and Land Surveyors.

The addition is approximately 91 ft. x 114 ft. with 16 ft. x 30 ft. bays. Prestressed beams run the 114 ft. length, spanning 16 ft. over the precast columns. Prestressed channel slabs of 12 in. depth span the 30 feet between the beams at floors and roof.

Owner: MINNESOTA RUBBER and GASKET CO., St. Louis Park, Minn.

Architect: MAGNEY, TUSLER & SETTER, Minneapolis, Minn.

Precast Concrete manufactured and erected by: PRESTRESSED CONCRETE, INC., St. Paul, Minn.

PRESTRESSED AND PRECAST STRUCTURAL CONCRETE FRAMING saved time and money for Minnesota Rubber and Gasket Company

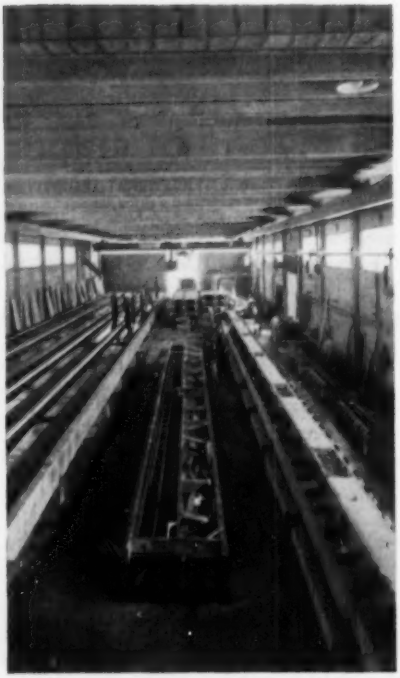
The new three story addition to the St. Louis Park, Minnesota, plant of Minnesota Rubber and Gasket Company is constructed entirely of precast concrete columns and prestressed beams, floor channels, and roof channels. These modern materials cut framing costs 20%, permitted 4 months earlier occupancy and eliminated expensive fireproofing.

LEHIGH EARLY STRENGTH CEMENT saved time and money for Prestressed Concrete, Inc.

All structural units were cast in the modern plant of Prestressed Concrete, Inc. Using Lehigh Early Strength Cement and hot water curing, the concrete reached 3500 PSI in 12 hours. As a result, the manufacturer gained maximum production efficiency and economy through early removal of units and quick reuse of forms.

Whatever your cement requirements, there are Lehigh Cements to fit them. And remember, somewhere on nearly every job, Lehigh Early Strength Cement will save time and money.

- **Lehigh Early Strength Cement**
- **Lehigh Mortar Cement**
- **Lehigh Portland Cement**
- **Lehigh Air-Entraining Cement**



Interior view of Prestressed Concrete's casting plant. Four channel beds at left are 200 ft. long. In center is bed for precasting reinforced beams. Next to the far right is a 100 ft. bed for prestressing beams. At the far right is a form for precasting columns.

LEHIGH PORTLAND CEMENT COMPANY

Allentown, Pa.

Turner seeks funds for medical education

H. C. Turner, Jr., president of Turner Construction Co., New York, has been named chairman of the building materials and construction division of the National Fund for Medical Education's committee of American industry. The national fund is seeking $10 million annually from business and industry for the nation's 82 hard-pressed medical schools.

Lehigh plans reserve quarry

Lehigh Portland Cement Co. is completing purchase plans for 2000 acres of land in Hounsfield, N. Y., at an estimated cost of $250,000. P. A. Groll, executive vice-president, has mentioned the necessity of establishing a reserve quarry to supply the firm's Buffalo plant with limestone materials.

Calaveras opens transfer plant

Officials of Calaveras Cement Co. have announced the opening of a 5000-bbl capacity bulk cement transfer plant in San Leandro, Calif., to facilitate deliveries to the construction industry in the bay area and northern California.

Alpha Portland names sales manager

Alpha Portland Cement Co., Easton, Pa., has appointed H. Eugene Brown as southern sales manager to succeed Charles P. Postelle who retired. Mr. Postelle had held this position since 1928 when Alpha purchased the Phoenix Portland Cement Co. Mr. Brown joined Alpha in 1924.

Admiral Moreell honored by USNA

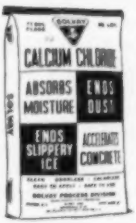
Adm. Ben Moreell, chairman of the board, Jones & Laughlin Steel Corp., Pittsburgh, was elected honorary member of the Naval Academy Alumni Association. The honor was conferred upon the CEC admiral in recognition of "his long and distinguished career in the Navy and his outstanding and conspicuous contributions to the naval service."

SAVE up to 50% on *protection time*

FOR 2% of SOLVAY CALCIUM CHLORIDE added to winter concrete

Like your concreting schedule to move equally fast winter or summer? With Solvay Calcium Chloride in your mix, there is no strength loss at 40°-50° F . . . no delays in finishing, moving forms, going from operation to operation.

Besides gaining early strength, you actually *increase* ultimate strength by adding Solvay Calcium Chloride, as well as assure uniform curing and greater workability. When ordering ready mix concrete be sure to specify the addition of Solvay Calcium Chloride.



NEW HANDY 25 LB. BAG
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Please send—at no cost—your booklet:

☐ "When the temperature drops BELOW 50°F., do you know what happens to CONCRETE?"

☐ "The Effects of Calcium Chloride on Portland Cement".

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Darex Diary

No. 11 of a series

by Henry L. Kennedy
Member, American Concrete Institute
Manager, Construction Products
Dewey & Almy Chemical Company

*Protective coating of concrete highways

*Curing air-entrained concrete

In these columns I have often referred to the excellent cement and concrete research laboratories Dewey and Almy maintains in Cambridge. There is another laboratory right at our New England doorstep which helps prove the performance of products made by the Construction Specialties Division. I am speaking, of course, of the New England climate.

Few areas of the country are more variable in weather. And under these conditions, our DARACONE water repellent, developed as a protective coating for all types of exterior masonry, has achieved a remarkable performance record.

Vermont, for example, has used DARACONE on some 30 bridges in the Barre-Montpelier area alone, to arrest spalling. In New Hampshire, this specially-developed silicone has been successfully used on highway bridges, bridge decks, sidewalks and bridge structures, both for preventive maintenance and to arrest further deterioration of structures. Connecticut highway officials are enthusiastic about DARACONE for preventive maintenance, while in Massachusetts, DARACONE is used on all Toll Road bridges.

In a great number of the instances mentioned above, DARACONE has been at work for more than three years—a considerable period when you reckon with the extremes of weather encountered in this corner of the country.

We have printed an interesting booklet on DARACONE. If you'd like a copy, just drop me a note, and ask for Booklet No. 3B1.

* * * * * * * * * * * *

Air entrainment in concrete, as is universally known, provides improved durability and resistance to freezing and thawing. However, air entrainment itself is not an automatic solution to all concrete problems. For example, the temperature at which the concrete is placed affects the final result. Even more important is the interval between finishing and the time the concrete is salted for de-icing purposes. Concrete must be allowed to mature. The concrete slab must cure and dry out to the extent that excess water is no longer available as freezable water.

To stimulate field exposure conditions, laboratory freezing and thawing tests were conducted with a 10% $CaCl_2$ solution in our Cement and Concrete Research Laboratories. A number of air-entrained concrete specimens were cured moist for 28 days and immediately subjected to 24-hour cycles of freezing and thawing. Companion specimens were cured moist for 14 days, and then dried out for 14 days before being subjected to the freezing and thawing cycles. At 40 cycles, the moist-cured showed 17% loss of weight, and the properly-cured but dried-out specimens only 2% loss. At 60 cycles, the moist-cured showed 31% loss, while the dried-out showed but 3% loss.

Field results substantiate these laboratory tests. On these jobs where air-entrained concrete showed a decided lack of durability, freezing weather had set in within six weeks of the time the concrete was finished, and salts had been applied shortly afterwards. When concrete is placed after October, a good rule is to keep salts off your highway for the first year.

DEWEY AND ALMY
CHEMICAL COMPANY
DIVISION OF W. R. GRACE & CO

Cambridge 40, Massachusetts; San Leandro, California; Montreal 32, Canada

New officers chosen for shale institute

Otto C. Frei, Atlanta, was elected president of the Expanded Shale, Clay and Slate Institute at its fourth annual meeting in San Francisco.

Other officers chosen were William H. Thomas, San Rafael, Calif., first vice-president; Allan P. Taylor, Louisville, Ky., second vice-president; L. A. Thorssen, Calgary, Alberta, Canada, secretary; and Ben F. Park, Ottawa, Kan., treasurer. Cedric Willson of Texas Industries, Inc., Fort Worth, who has been chairman of the technical problems committee for the past 4 years, resigned this post and was succeeded by Carl Rollins, Basalt Rock Co., Napa, Calif.

Huron plans expansion

Scheduled for completion this fall is a $150,000 addition to Huron Portland Cement Co.'s plant at Oswego, N. Y., consisting of four new storage bins and loading out equipment.

These facilities will increase Huron's storage capacity by about 70,000 bbl or approximately double the present capacity.

Love appointed by Calaveras

T. L. Love, Sr., has been appointed assistant manager of the San Andreas, Calif., plant of Calaveras Cement Co., San Francisco. Earle M. Bagley, Jr., is the new superintendent of raw materials, and James C. Powell has been made plant engineer.

Kaplan joins Gas Purifying Co.

Aaron Kaplan has joined the staff of Gas Purifying Materials, Inc., Long Island City, N. Y., as manager of industrial sales. Mr. Kaplan formerly was with L. Sonneborn Sons, Inc.

Zimmerman appointed executive vice-president of Pennsylvania Prestress, Inc.

John K. Zimmerman, Camp Hill, Pa., has been appointed executive vice-president of Pennsylvania Prestress, Inc., a new prestressed concrete products manufacturing firm located near Harrisburg.

Basalt names sales manager

Appointed general sales manager of the aggregate division of Basalt Rock Co., Inc., Napa, Calif., is Joseph E. Mirani. He succeeds Malcom S. McIntyre, who retired after 23 years of service. Mr. Mirani joined the firm in 1934.

Senior appointed construction manager

Richard L. Senior has been appointed construction manager of F. H. McGraw & Co., engineers and constructors, New York. He formerly was operations manager for Peter Kiewit Co. on the Atomic Energy Commission plant at Portsmouth, Ohio.

Bodwell joins Union Corporation

Russell S. Bodwell has been appointed assistant chief engineer of the Union Building and Construction Corp., Passaic, N. J. Mr. Bodwell was with Porter, Urquhart, McCreary, and O'Brien of Newark for 9 years, serving as project manager on the New Jersey and Connecticut Turnpikes, soils and paving engineer on other turnpike projects, and working with the Corps of Engineers.

Huron Portland Cement names appointees; a new department inaugurated

Appointed assistant general sales manager for Huron Portland Cement Co., Detroit, is Lee C. Hamilton. He succeeds D. T. Meyers, retired. Ralph F. Dickson, assistant divisional sales manager, has been named divisional sales manager, Ohio and Wisconsin districts, succeeding Mr. Hamilton.

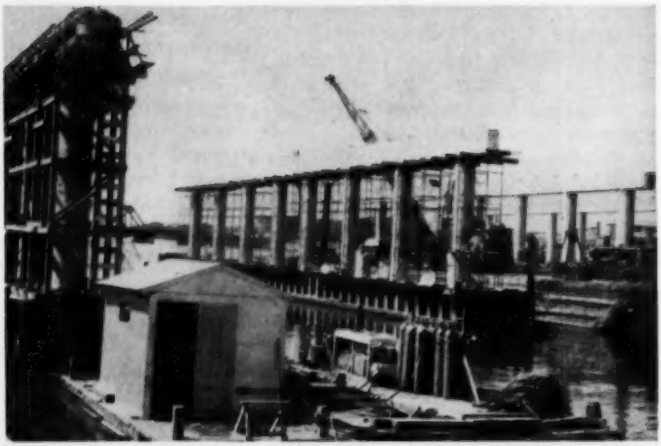
Huron Portland Cement Co. recently inaugurated an advertising and promotion department headed by Robert L. Freeman, formerly technical service engineer.

ACIL stages convention

Presidents and laboratory directors of some 50 independent laboratories participated in the recent 4-day annual convention of the American Council of Independent Laboratories, Inc., in New York. The council is the professional association of independent

BRIDGE-BUILDING WITH LOW COST SONOTUBES!®

Providence River Bridge, North-South Freeway, Providence, R. I. Rhode Island Dept. of Public Works, Div. of Roads & Bridges. M. A. Gammino Company, contractors. Charles A. Maguire & Associates, Boston, consulting engineers. Photo: Courtesy New England Construction



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The typical river bent for the Providence River Bridge included a concrete girder about 140 feet long supported on eight 36 inch diameter round concrete columns formed by SONOTUBES.

These columns, in turn, are supported by a solid granite-faced pier section resting on a heavy tremie seal foundation and long steel H-piles.

Figure on using SONOTUBE Fibre Forms on your next bridge-building job and save time, money and labor!

Low-cost SONOTUBES are available in practically all sizes up to 48" I.D. and to 48' long. Order in required lengths or saw to your specifications on the job.

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January 28 - February 2 • International Amphitheater, Chicago

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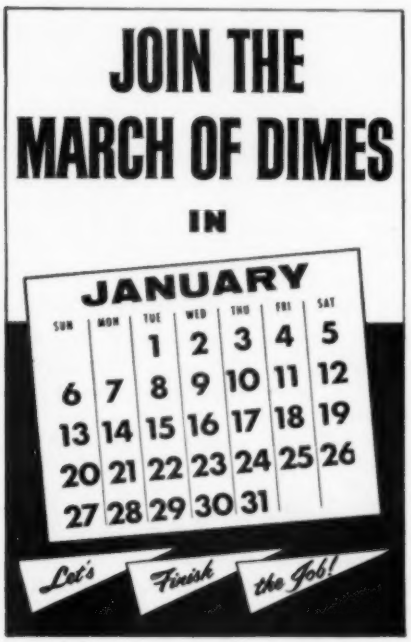
laboratories, maintaining offices and branches in principal cities of the country. They serve the production, manufacturing and distribution industries, importers and exporters, medical and legal professions, and many domestic and foreign governmental agencies as well.

Calaveras purchases stock

Calaveras Cement Co., San Francisco, has purchased a majority of stock in the following California transit-mix and gravel producing companies: Standard Materials Co., Inc., of Modesto; River Rock, Inc., and Concrete Supply Co., Inc., both of Merced; Merced Sand & Gravel, Inc., Atwater; and Standard Rock Co., Inc., Escalon.

Hauser named superintendent of Milwaukee plant

Karl V. Hauser has been appointed superintendent of the new Milwaukee cement plant of Marquette Cement Manufacturing Co. which is now under construction. It is expected to be in production in December.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6 7 8 9 10 11 12
13 14 15 16 17 18 19
20 21 22 23 24 25 26
27 28 29 30 31
Let's Finish the Job!

LOOKING AHEAD

January 7-11, 1957—Highway Research Board, Annual Meeting, Sheraton-Park Hotel, Washington, D. C.

January 15-17, 1957—National Crushed Stone Association, 40th Annual Convention, American Hotel, Miami Beach, Florida

January 23, 1957—National Crushed Limestone Institute, Annual Convention, Statler Hotel, Washington, D. C.

January 27-30, 1957—Associated Equipment Distributors, 38th Annual Meeting, Conrad Hilton Hotel, Chicago, Ill.

January 28-31, 1957—Plant Maintenance and Engineering Show, Public Auditorium, Cleveland, Ohio

January 28-February 2, 1957—American Road Builders' Association, Road Show and 55th Annual Convention, International Amphitheater, Chicago, Ill.

February 11-14, 1957—National Sand and Gravel Association, 41st Annual Convention, Statler Hotel, Los Angeles, Calif.

February 11-14, 1957—National Ready Mixed Concrete Association, 27th Annual Convention, Statler Hotel, Los Angeles, Calif.

February 25-28, 1957—American Concrete Institute, 53rd Annual Convention, Statler Hilton Hotel, Dallas, Texas

February 25-28, 1957—National Concrete Masonry Association, 37th Annual Convention and Concrete Industries Exposition, Kiel Auditorium, St. Louis, Mo.

March 5-9, 1957—American Concrete Pipe Association, 48th Annual Convention, Shoreham Hotel, Washington, D. C.

March 11-14, 1957—Associated General Contractors of America, Annual Meeting, Statler Hotel, Washington, D. C.

Why CEMENT GELS Concern You...

WHAT IS A CEMENT GEL?

A cement gel is a jelly-like swelling that occurs around each grain of portland cement when water is added to the concrete mix. It is the initial reaction product between cement and water. The gel is the controlling factor in cracking, uniformity and structural quality of concrete.

The cement gel imparts fatty and cohesive properties to the mix. As hydration of the cement proceeds, the gel partly crystallizes and, on drying, reverts to almost the original cement grain size.

Gel size and hydration vary widely, depending upon water and temperature. It is this difference that causes variations in the quality of concrete for a given mix design.

In the heat of summer gels form faster and larger. Large gels absorb more water from the mix. Thus, more mixing water is required for adequate workability. The resulting concrete has poorer quality. As water is consumed by hydration and lost through evaporation, internal stresses are created. These eventually result in shrinkage cracks.

In cooler weather gel formation is retarded. Smaller gels are formed, and less mixing water is needed. Concrete quality is proportionately better. Less shrinkage occurs, the concrete is more dense and has higher structural quality.

Thus, the gel is the governing factor in controlling the uniformity, structural quality and cracking of your concrete.

CEMENT GELS CAN BE CONTROLLED

The size and action of the cement gel can be controlled chemically with a gel-reducing agent developed exclusively for this purpose, Plastiment Concrete Densifier.

Plastiment reduces gel size and retards hydration in direct proportion to the quantity added. This effect is uniform and predictable with all types of concrete. Changes in mix design, aggregate graduation, use of air entraining or other additives do not affect its action. Results of this controlled gel size are: higher density, higher compressive strength, higher bond to steel and reduced cracking.

With this constant predictable effect, it is logical to keep the gel formation and setting time uniform by increasing the quantity of Plastiment as temperature rises. In this way, Plastiment offsets the damaging effects of high temperatures.

CEMENT GEL 90°F. | CEMENT GEL 50°F. | PLASTIMENT-CONTROLLED CEMENT GEL

Smaller chemically-controlled gels result in an exclusive rapid clear water bleeding action, without scum and laitance being carried to the surface. This acts as a safety factor should concrete receive an over-dose of water at the job-site.

Plastiment is thoroughly dependable and performs exactly as stated. For this reason, Plastiment has been the logical choice of top structural designers for most of the floating concrete structures and large prestressed structures in the world today, as well as a great variety of other structures where uniformity and high quality of the concrete is essential.

Plastiment offers each engineer a dependable tool for controlling setting time, uniformity and cracking in concrete.

LET PLASTIMENT WORK FOR YOU

Our engineers will be glad to tell you how Plastiment can help you on your current job. For more detailed information on Plastiment's action on the cement gel, write today for a copy of the illustrated booklet "Plastiment Concrete Densifier."

PLASTIMENT
CONCRETE DENSIFIER
SIKA Chemical Corporation, Passaic, N. J.

DISTRICT OFFICES: BOSTON • CHICAGO • DALLAS • PHILADELPHIA PITTSBURGH • SALT LAKE CITY • WASHINGTON, D. C. • MONTREAL, CANADA • PANAMA CITY, PANAMA • DEALERS IN PRINCIPAL CITIES

James E. Bates

James E. Bates, retired assistant to Harris N. Snyder, president of Federal Portland Cement Co., Buffalo, N. Y., died recently. He retired in 1955 when Penn-Dixie Cement Corp. acquired Federal Portland Cement Co.

Shortridge Hardesty

Shortridge Hardesty, general partner of Hardesty and Hanover, New York, died recently. A graduate of Drake University and Rensselaer Polytechnic Institute, he entered the office of Waddell and Harrington in Kansas City, Mo., and continued with them through 1915. He became designing engineer of the firm of Waddell and Son in 1916 and in 1920 came to New York City with J. A. L. Waddell, in active charge of the latter's work in connection with the design and construction of a large number of bridges. In 1927 he became a partner in the firm of Waddell and Hardesty; in June, 1945, the partnership of Hardesty and Hanover took over the practice of Waddell and Hardesty.

Mr. Hardesty was also associated as a consultant in the preparation of planning studies for the cities of Portland, Ore., and New Orleans, La. He designed the structural frames of the Trylon and Perisphere for the New York World's Fair, and made extensive studies relative to the design of structural, mechanical, and electrical features of movable bridges, long-span cantilever, arch, and suspension bridges, fatigue in structural members, and the application of lightweight floors, alloy steels, and structural aluminum to bridge design and construction.

An ACI member since 1941, he was a life member and honorary member of the American Society of Civil Engineers, and also was a member of many other engineering associations.

Jonathan Blaine John

Jonathan Blaine John, chairman of the board of the Medusa Portland Cement Co., Cleveland, and a nationally recognized safety leader, died recently. He was credited with being the "father" of the safety movement in the cement industry and for 10 years was chairman of the accident prevention committee of the Portland Cement Association.

Mr. John began his career in the industry at Ormrod, Pa., in 1898. His first connection with Medusa was as a consulting engineer in the building of the Silica, Ohio, plant. He was named president of Medusa in 1922, and chairman of the board in 1951.

Chester Nelson Reitze

Chester Nelson Reitze, who retired in 1947 as president of Superior Portland Cement, Inc., died recently in Seattle. A 1905 civil engineering graduate of Cornell, he first was a partner in the Seattle engineering firm of Reitze, Storey, and Duffy before becoming Pacific Coast manager of the Portland Cement Association. He had been with Superior Portland Cement, Inc., for about 30 years.

Herbert D. Sullivan

Herbert D. Sullivan, vice-president and general manager, Central Pre-Mix Concrete Co. and Union Sand and Gravel Co., Spokane, died recently after an extended illness. Mr. Sullivan was widely recognized for his knowledge of the concrete business, having been a pioneer in the Pre-Mix company, starting as a partner with William M. Murphy in 1933. Mr. Sullivan, who joined ACI in 1938, was active in the American Society of Testing Materials, a member of the Associated General Contractors, and was instrumental in founding the Spokane Construction Council.

Melvin O. Sylliaasen

Melvin O. Sylliaasen, consulting engineer, died recently in Seattle. He served as Seattle city engineer from 1932-34 and had conducted his own practice in the structural field until the time of his death. He had been an Institute member since 1927.

Louis Tolnay

Dr. Louis Tolnay, of Argentina and formerly a Los Angeles resident, died recently in Argentina. At the time of his death he was employed in the hydraulic power division of The Bechtel Corp. and was associated with Julian Hinds, consulting engineer, in arch dam design and analysis. Dr. Tolnay had been an ACI member since 1955.

Who's Who This Month

ACI Committee 214

"Proposed Recommended Practice for Evaluation of Compression Test Results of Field Concrete," p. 561, is the work of ACI Committee 214. The committee is headed by W. A. Cordon, University of Utah.

Members of the committee include: Edward A. Abdun-Nur, consulting engineer; Delmar L. Bloem, National Sand and Gravel Association and National Ready Mixed Concrete Association; T. G. Clendenning, Hydro-Electric Power Commission of Ontario; Herbert K. Cook, Master Builders Research Laboratories; Louis A. Dahl, Portland Cement Association; R. J. Elfert, Bureau of Reclamation; J. A. Kauer, Huron Portland Cement Co., Thomas B. Kennedy, U. S. Waterways Experiment Station: J. D. Lindsay, Illinois Highway Department; Edmund A. Pratt, consulting engineer; Horace A. Pratt, University of Maine; and Charles S. Whitney, Ammann and Whitney.

R. E. Davis, Jr., and Charles E. Haltenhoff

Co-authors of "Mackinac Bridge Pier Construction," p. 581, are R. E. Davis, Jr., assistant to the executive vice-president of Intrusion-Prepakt, Inc., Cleveland, and Charles E. Haltenhoff, newly named manager of the Mackinac Straits Bridge, St. Ignace, Mich.

Mr. Davis spent 2 years in research on concrete admixtures after attending the University of California. He joined Intrusion-Prepakt as field engineer in 1950. He has served his firm as manager of the California regional office, general superintendent of the Kemano Penstock project, and project engineer for the Mackinac Straits Bridge. Mr. Davis joined ACI in 1948. Members will remember his paper, co-authored with G. E. Wendell, in the November, 1955, JOURNAL, "Kemano Penstock Tunnel Liner Backfilled with Prepacked Concrete."

Mr. Haltenhoff's recent appointment as manager of the Mackinac Straits Bridge by the Mackinac Bridge Authority climaxes 2 years of supervisory work on the bridge as an employee of Merritt-Chapman and Scott Corp.

After graduating from Lehigh University in 1951, Mr. Haltenhoff rejoined Merritt-Chapman and Scott as an estimator until 1954. He had spent 1½ years with them in Florida as office engineer preceding his college work. In January, 1954, he was assigned as office engineer for the Mackinac bridge and became project engineer the following August. Last January he was named bridge project manager, and from July to November he served as resident manager of the Boston area before resigning for his new position.

G. M. Smith and L. E. Young

G. M. Smith and L. E. Young prepared the paper, "Ultimate Flexural Analysis Based on Stress-Strain Curves of Cylinders," that appears on p. 597.

Mr. Smith, associate professor of engineering mechanics, University of Nebraska, graduated from Kansas State College with a BS in mechanical engineering in 1947 and a MS in applied mechanics in 1951. He spent 4 years at Kansas State in the study of special concrete problems relating to durability while serving as assistant professor of applied mechanics. In 1953 he joined the faculty of the University of Nebraska. He has been a member of ACI since 1951, and a previous JOURNAL contribution, "Use of Chicago Fly Ash in Reducing Cement-Aggregate Reaction," with C. H. Scholer (ACI JOURNAL, February 1952), was awarded the Wason Research Medal.

Mr. Young, assistant professor of engineering mechanics, University of Nebraska, graduated from the University of Minnesota with a BS in civil engineering in 1941 and received his MS there in 1949. He taught at the University of Minnesota before joining the faculty of the University of Nebraska. His present duties combine teaching and research. He joined ACI in 1955.

Membership in the American Concrete Institute

To facilitate prospective members in joining the Institute, membership application forms are provided. Present Members may aid by bringing these forms to the attention of those who may profit from membership advantages. The grades of membership are described overleaf.

All who have an interest in concrete are eligible for membership.

Members have at hand in Institute publications the most complete fund of knowledge on concrete. The ACI JOURNAL provides them with the latest information and ACI special publications provide them with the complete picture of specific problems. Through conventions, and regional and area meetings they are afforded the opportunity of meeting those whose experiences provide the new information, and of exchanging ideas with them.

Opportunity for service is present in technical committee activity, in contributions, or only comments, to the ACI JOURNAL, or in reviewing technical publications for material of interest to the membership.

ACI's world-wide membership is growing in extent and participation—traveling a common road toward better, more economical and durable concrete structures. ACI provides a common ground in the search for and use of new "working tools" in concrete design, manufacture, and erection—and its interpretation.

(cut here)

Board of Direction, American Concrete Institute **Date**_____
18263 W. McNichols Road
Detroit 19, Michigan

Individual Members (U. S. and Possessions, Canada, Mexico, Central America, and West Indies)	$15.00
Individual Members (All other foreign countries)	12.00
Corporation Members	50.00
Contributing Members	100.00
Junior Members—nonvoting (under 28)	7.50
Student Members—nonvoting (under 28)	5.00

(Subject to stipulations of Bylaws—Article I on reverse side Bylaws on request.)

Of the annual dues, $12.00 is for the JOURNAL of the American Concrete Institute (except that dues for Junior and Student Members apply in full for the JOURNAL).

The undersigned hereby applies for _____ **membership**
(Individual, Corporation, Contributing, Junior, Student)

in the American Concrete Institute. Proposed by _____

For Corporation Membership, ACI representative will be _____

_____ _____
(Date of graduation if Student) (Name, if Corporation)

Signature _____

For our records, please complete both sides of application.

EXCERPTS FROM BYLAWS: ARTICLE I—MEMBERS

Section 1. This Institute shall consist of Members, Corporation Members, Contributing Members, Junior Members, Student Members, and Honorary Members interested in furthering the Institute's objects as set forth in its Charter.

Sec. 2. A Member shall be an individual. A Corporation Member shall be a firm, corporation, society, agency of government or other organization. A Corporation Member shall name one individual as its representative who will enjoy all membership rights and privileges.

A Contributing Member shall be an individual, firm, corporation, society, agency of government, or other organization wishing to give larger support to Institute activities through the payment of larger dues. Contributing Members, other than individuals, shall name representatives as do Corporation Members.

A Junior Member shall be a person less than 28 years old.

A Student Member shall be less than 28 years old and a student in residence at a recognized technical or engineering school.

An Honorary Member shall be a person of eminence in the field of the Institute's interest, or one who has performed extraordinarily meritorious service to the Institute.

Sec. 3. All classes of Members except Honorary Members and Student Members, shall be proposed by at least one Member of the Institute and elected by a two-thirds vote of the Board of Direction. An Honorary Member shall be elected by unanimous vote of the Board of Direction. A Student Member shall be proposed by a member of his school's faculty, who need not be a Member of the Institute, and elected by a two-thirds vote of the Board of Direction.

Sec. 4. All Members shall have all rights and privileges of membership as determined by the Board of Direction except that a Junior or Student Member shall not vote nor hold office. The status of a Student Member shall change automatically to that of Junior Member on the first anniversary of his membership succeeding the date on which he ceases to be a student in residence. The status of a Junior Member shall be changed to that of Member on the first anniversary of his membership after he becomes 28 years of age.

Sec. 5. Applications for and resignations from Membership and requests for change of representatives of Corporation or Contributing Memberships shall be presented in writing to the Secretary-Treasurer. Resignations may be accepted only from Members whose dues are not more than 60 days in arrears, except by special action of the Board of Direction.

(cut here)

Name _____
Please Print

Date of Birth _____
Month Day Year

Title or Position _____

Name of Firm or Organization _____

☐ **Business Address** _____

☐ **Resident Address** _____
(Please check address to which you wish mail and publications sent)

Nature of Firm's Business _____

Honor Roll

February 1—October 31, 1956

First place is still held by Jose L. Capacete with 33 credits. Federico Barona de la O remains in second with 10. Jaime de las Casas and James A. McCarthy are tied in third place with 9 credits. W. H. Armstrong, Phil M. Ferguson, and Walter E. Fisher are tied for fourth place with 8 credits each.

Our total membership as of Oct. 1, 1956, was 8134. We hope to raise this figure to 9000 by the end of the Honor Roll year.

Will your name be among those helping to contribute to the growth of ACI? New members mean new ideas; therefore if each member would introduce one new applicant to the Institute the benefits to both them and to ACI would be doubled.

Jose L. Capacete	33
Federico Barona de la O	10
Jaime de las Casas	9
James A. McCarthy	9
W. H. Armstrong	8
Phil M. Ferguson	8
Walter E. Fisher	8
S. E. Acker	7
Newlin D. Morgan, Jr.	7
Jacob J. Creskoff	6
Martin J. Gutzmiller	6
H. C. Pfannkuche	6
George F. Bishop	5
George M. Brief	5
Arthur N. L. Chiu	5
J. W. Kelly	5
L. M. Legatski	5
Harry C. Saxe	5
George L. Blanchard	4
Samuel Hobbs	4
Ignacio Martin B.	4
Ellis S. Vieser	4
Koker Al-Asady	3
G. W. Bernard	3
W. S. Burke	3
Daniel M. Cashdan	3
M. A. Craven	3
Louis A. Gottheil	3
E. L. Howard, Jr.	3
J. E. Jellick	3
Masatane Kokubu	3
Stanley Kresky	3
Gene M. Nordby	3
Constantin Polidoroff	3
Melchor Rodriguez C.	3
C. H. Scholer	3
Delbert Smith	3
K. E. Whitman	3
Mihran S. Agbabian	2
R. F. Blanks	2
A. H. Brownfield	2
S. L. Burns	2
T. J. Cavanagh	2
Howard F. Christensen	2
Miles N. Clair	2
Anthony J. Costanza	2
W. S. Cottingham	2
Claudio Creamer G.	2
Clayton M. Crosier	2
Roger D. deCossio	2
James N. DeSerio	2
Julius Dorfman	2
William M. Dreisig	2
William J. Eney	2
Gordon P. Fisher	2
Donald R. Frost	2
J. Guillermo Galvan	2
Kenneth Gedney	2
Gerald K. Gillan	2
John S. Hattrup	2
Frank T. Higgins, Jr.	2
Myle J. Holley, Jr.	2
Peter H. Hostmark	2
H. N. Howe	2
M. W. Huggins	2
Henry L. Kennedy	2
B. T. Kerr	2
Fazlur R. Khan	2
M. H. Kubba	2
Federico Leon	2
Arthur A. Levison	2
John B. McConville	2
R. H. Mahimtura	2
George T. Mahoney	2
Elbert Drew Mayes	2
L. J. Meszaros	2
A. F. Moore	2
Chia Muktabhant	2
Henry L. Neve	2
Adrian Pauw	2
Abdur-Rahman S. Rasul	2
Leo E. Rivkind	2
Salvador Rodriguez	2
Martin Schulz	2
Morris Schupack	2
C. W. N. Sexton	2
Theodore Sheafer	2
Max Sittenfeld	2
Mandrup Skeie	2
Floyd O. Slate	2
Murray Slater	2
G. B. Southworth	2
Ralph E. Spears	2
Joaquin Spinell	2
John Steinbrugge	2
L. J. Sullivan	2
Emin Veral	2
Joseph J. Waddell	2
Byron P. Weintz	2
Thomas J. Whitten	2
Charles C. Zollman	2

McCallum joins Kansas City firm

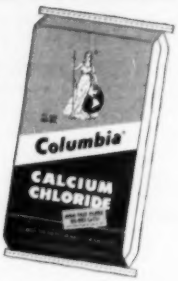
Kivett and Myers, architects and engineers of Kansas City, Mo., have announced that Angus McCallum has joined the firm of Kivett and Myers and McCallum.

Announcing . . .

HIGH TEST FLAKE

COLUMBIA CALCIUM CHLORIDE

Now ready for your use in all types of concrete construction



Columbia HIGH TEST FLAKE Calcium Chloride which tests 95-98% $CaCl_2$ is now being shipped from the Barberton, Ohio, plant.

This new HIGH TEST FLAKE production is in addition to Columbia's Regular Flake.

Columbia HIGH TEST FLAKE Calcium Chloride has approximately 20% higher calcium chloride content than Regular Flake. An 80 pound bag of HIGH TEST FLAKE does the job of 100 pounds of Regular Flake. This higher concentration results in (1) smaller tonnages for you to handle, and (2) freight savings due to the higher calcium chloride content by weight.

Now, for the first time, Columbia-Southern offers $CaCl_2$ users a convenient, easy to handle 80 pound bag.

Contact your Columbia supplier or your nearest district sales office for prompt delivery on your HIGH TEST or REGULAR FLAKE calcium chloride requirements.

Columbia Calcium Chloride for better, stronger concrete faster!

These are the advantages you get by using Columbia Calcium Chloride in your concrete mix: Quicker set . . . Higher early strength . . . Greater ultimate strength . . . Better curing . . . Faster form removal . . . Reduced overtime . . . Earlier completion of the construction schedule.

Write today for more information on Columbia Calcium Chloride for concrete curing

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New Members

The Board of Direction approved 106 Individual applications, 2 Corporations, 20 Juniors, and 57 Students, making a total of 185 new members. Considering losses due to resignations, deaths, and nonpayment of dues, the total membership on Nov. 1, 1956, was 8274.

INDIVIDUALS

AGRAWAL, P. C., New Delhi, India (Member, Bhakra Nangal High Power Committee, Government of Punjab, India)

AGRIMSON, DONALD M., Honolulu, Hawaii (Constr. Management Engr., Navy, District Public Works Office, Pearl Harbor, Hawaii)

ALEXANDER, ALBERT M., New Orleans, La. (Struct. Engr.)

ANDERSON, GEORGE M., Seattle, Wash. (Struct. Engr., Bridges)

BEECHE, FERNANDO F., San Jose, Costa Rica (C. E., Beeche y Fait Ltda.)

BENNETT, GEORGE D., Ft. Lauderdale, Fla. (Asst. Sec'y. Engr., Estim., Powell Brothers, Inc.)

BLOUNT, ALLEN T., Baltimore, Md. (Designer, Van Rennselaer P. Saxe)

BORRERO, FRANCISCO, Santiago de Cuba, Cuba (Field Engr., Texas Oil Co.)

BRUSH, EDWARD E., Chicago, Ill. (Sales Mgr., Soiltest, Inc.)

CABALLERO RODRIGUEZ, HERNAN, Lima, Peru (C. E., Ministerio de Fomento y Obras Publicas Del Peru)

CAPLAN, L., Johannesburg, S. Africa (Managing Director, A. S. Joffe & Co. (Pty) Limited)

CASARES-NICOLIN, MANUEL, Mexico, D. F., Mexico (Sales Engr., Casa Wiesley, S. A.)

CASTANO, ALBERTO LEON, Bogota, Colombia (C. E., Spinel & Cia. Ltda.)

CONWAY, WILLIAM J., JR., Mojave, Calif. (California Portland Cement Co.)

COX, ALLEN G., Urbana, Ill. (Struct. Engr., Clark & Daily)

COYNE, ANDRE, Paris, France (Cons. Engr.)

CHRYSLER, RALPH E., Toronto, Ont., Canada (Engr., Struct. Design, W. S. Atkins & Assoc., Ltd.)

DARGEL, H. F., Zandvoort Aan Zee, Netherlands (Research, Promotion, Superintendency, Round the World Home Construction)

DE LANDERO, CARLOS A., Mexico, D. F., Mexico (Asst. to Gen. Supt. of Constr., Compania Mexicana de Luz y Fuerza Motriz, S. A.)

DOFG, RUSSELL E., Richmond Hill, N. Y. (Struct. Engr., Andrews & Clark, New York, N. Y.)

DODD, DAVID H., Gallatin, Tenn. (Mfr., Molds & Equipment for Prestressed Concrete)

DUNNE, GEORGE EDWARD, Anzac, Alberta, Canada (Site Engr., Bell Telephone Co., Special Contracts Dept.)

EHRENBURG, OTTO, Fresno, Calif. (Inspector Cl. A., Concrete Testing & Control, Kings River Proj., Pacific Gas & Electric Co.)

FARRINGTON, ELVIN, Guatemala, Guatemala (C. E., Direccion General de Obras Publicas)

FIANDER, LEO F., Baltimore, Md. (Engr., Design, Detail & Supv., Joseph K. Knoerle & Assoc.)

GAIN, EDWARD JACOB ARTHUR, St. Louis, Mo. (Chf. Engr. of Engrg. Dept., Metropolitan St. Louis Sewer District)

GARCIA, HENRY, Detroit, Mich. (Estimating & Outside Supv., Reinforced Steel Erectors Corp.)

GASPARI, DONALD J., Staten Island, N. Y. (Struct. Group Leader, H. K. Ferguson, New York, N. Y.)

GEARHART, HAROLD E., Pittsburgh, Pa. (Design Engr., Foundations & Struct. Design, Swindell-Dressler Corp.)

GONZALEZ, FELIX MORAN, Caracas, Venezuela (C. E., Ministerio De Agricultura y Cria)

GONZALES-ACEVEDO, Guillermo, Caracas, Venezuela (Hydraulic & Struct. Analysis & Design, Oficina Tecnica Michelena & Alvarez)

HAMMAN, ROY P., Encino, Calif. (C. E., Struct. Assoc., Benedict, Beckler & Assoc., Los Angeles, Calif.)

HANSGEN, R. PAUL, Sarasota, Fla. (Supt., West Coast Shell Corp.)

HAY, BRUCE ALEXANDER, Toronto, Ont., Canada (Chf. Engr., Intrusion-Prepakt Limited)

HERNANDEZ, RAFAEL HERNANDEZ, Tacubaya, D. F., Mexico (Sales, Engr., Casa Wiesley, S. A., Mexico, D. F., Mexico)

HOLM, WALLACE, Monterey, Calif. (Partner, Butner, Holm & Waterman, Archs.)

HOSKIN, E. D. E., Montreal, Que., Canada (Owner, Hoskin Scientific Co.)

HOWARD, CLYDE A., Cheyenne, Wyo. (Grad. Stud. in Civil Engr., Univ. of Wyo.)

HUDSON, SAMUEL T., Philadelphia, Pa. (Engr., J. E. Brenneman Co.)

INGBERG, S. HANSON, Bethesda, Md. (Cons. Struct. & Fire Protection Engr.)

JOA, WILLIAM A., Vancouver, B. C., Canada (Prof. Engr., Struct., Foundation of Canada Engrg. Corp.)

JOHNSTON, MASON, Ottawa, Ont., Canada (Distr. Distributor, Sika Chemical Corp.)

JUNEAU, MAURICE, Montreal, Que., Canada (Branch Mgr., In and Out, Saunders Form Hardware Ltd.)

KATZ, ERNESTO, Lima, Peru (Mgr., Concreto Vibrado, S. A.)

KEEBLE, A. L., Reading, Berks, England (Joint Managing Director, Messrs Checcol Processes Ltd.)

KHARRUFA, N. S., Baghdad, Iraq (Professor of Quantity Surveying & Specifications, Engineering College & Cons. Engr., Private Practice)

KILBURN, CARL, New Orleans, La. (Sales Mgr., Big River Industries, Inc., Baton Rouge, La.)

KIMISHIMA, HIROTSUGU, Toyko, Japan (Research Engr. in Struct. Div., Central Research Institute for Electric Power Companies)

KLOSS, HANS, Detroit, Michigan (Chf. Struct. Engr., Giffels & Vallet)

KORST, NILS, Stamford, Conn. (Partner, Werner Jensen Associates, Cons. Engrs.)

KRAMER, H. W., Seattle, Wash. (Partner, Carey & Kramer, Cons. Engrs.)

LAIRD, A. NORMAN, Dearborn, Mich. (Chf. Engr., Grand Trunk Western R. R., Detroit, Mich.)

LARA P., NAPOLEON, San Salvador, El Salvador (Draftsman, Ministerio De. O. O. P. P., Dept. of Architecture & Stud., Univ. of Salvador)

LAUGHLIN, ROBERT J., Quincy, Wash. (Field Engineer, Harza Engrg. Co., Ephrata, Wash.)

LESLIE, ROBERT T., Cape Town, South Africa (Cons. Civil Engr.)

LEVINSON, GEORGE M., Pittsburgh, Pa. (Struct. Engr.)

LUQUE LOYOLA, JORGE, Mexico, D. F., Mexico (Gen. Supt. Dept. of Constr., Compania Mexicana de Luz y Fuerza Motiz, S. A.)

MCALONEN, E., Toronto, Ont., Canada (Sales Mgr. & Specialized Masonry Advice, Thoro Building Materials Ltd.)

MCCALLIN, ROBERT J., Wampum, Penna. (Technical Service Engr., Medusa Portland Cement Co.)

MCCLELLAN, THOMAS J., Corvallis, Oregon (Assoc. Prof. of Civil Engr., Oregon State College)

MCCOMBS, GLENN C., Fittsburgh, Pa. (Struct. Engr., Gulf Oil Corp.)

MCCUE, GERALD M., Berkeley, Calif. (Arch.)

MAGUIRE, FRANK J., New York, N. Y. (Chf. Engr., Middle East District, Corps of Engrs., U. S. Army)

MAIER, GILBERT L., Linton, N. Dakota (Engr., Manage Plant, Beaver Concr. Products)

MARKEY, STANLEY, Minneapolis, Minn. (Struct. Engr., Power Service Corp.)

MARTELL, CHARLES, South Boston, Mass. (Asst. Div. Engr., Highway Div., PWD., City of Boston)

MARTIN, ALBERT E., Maple, Ont., Canada (Pres. & Gen. Mgr., Almar Specialty Machines Limited)

MASSO, JUSTO RIVAS, Cidra, Puerto Rico (Distr. Engr., Bureau of Permits for Building Constr., Puerto Rico Planning Board)

MONTUORI, DANTE F., Newton Ctr., Mass. (Design & Constr. Supv., Endecon Corp.)

MORALES, ILDEMARO, LEON, Caracas, Venezuela (C. E., Ministerio de Agricultura y Cria)

MORICE, PETER BEAUMONT, Chorleywood, Herts., England (Head of Structures Research Dept., Cement & Concrete Assn., London, England)

MORTON, ERIC JOHN, Birmingham, England (Designer/Detailer, W. V. Zinn, Cons. Civil & Struct. Engr.)

MOYER, CECIL S., Oakland, Calif. (Arch.)

MULLKOFF, ARTHUR J., Detroit, Mich. (Struct. Engr., (Civil), Giffels & Vallet)
MYLES, JOHN R., Saint John, N. B., Canada (Partner, Mott & Myles, Archs. & Engrs.)
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SHERMAN, ROBERT, Flushing, L. I., N. Y. (Designer, Sanderson & Porter, New York, N. Y.)
SPIERS, BRIAN CLIFFORD, Johannesburg, S. Africa (In charge of all Design & Control of Concrete, Lewis Constr. Co. (S. A.) Ltd.)
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STEARNS, EUGENE, Montreal, Que., Canada (Exec. Vice-Pres., Porete Co. (Canada) Ltd.)
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BANKS, RONALD H., Montreal, Que., Canada [Design Engr., Civil, Precompressed Concrete Engineering Co. Ltd. (PRECO)]
ERIKSON, JAMES A., Chicago, Ill. (Designing, Leonard Construction Co.)
GAVILLET, EMMANUEL, Westmont, Que., Canada (Designer, Precompressed Concrete Engineering Co., Montreal, Que., Canada)
HARRIS, SYDNEY, Brooklyn, N. Y. (C. E., Seeyle, Stevenson, Value & Knecht, New York, N. Y.)
HOLM, AAGE, Astoria, N. Y. (Struct. Designer, Andrews & Clark, New York, N. Y.)
JOHNSON, DONALD EDWARD, Ithaca, N. Y. (Grad. Stud., Cornell Univ.)
KAPLAN, SAUL M., Dept. of Engrg. Mechanics, University Park, Pa. (Instructor, Pennsylvania State University)
MCGREEVY, JOHN PATRICK, Massena, N. Y. (Aggregate Control, Uhl, Hall & Rich, Engrs.)
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STUDENT

ACUNA, ROBERTO PACHECO, Lima, Peru (Universidad Nacional Ingenieria)
AQUIRRE, ALEJANDRO FLORES, Lima, Peru (Universidad Nacional de Ingenieria)
ALFIERI, ENRIQUE MARIO, Urbana, Ill. (Univ. of Ill.)
AMOROS, EMILIO FRANCHY, Lima, Peru (Universidad Nacional Ingenieria)
ARENAL, CARLOS RODRIGUEZ, Lima, Peru (Universidad Nacional Ingenieria)
ARISNABARRETA, JUAN ARCE, Lima, Peru (Universidad Nacional Ingenieria)
ARMSTRONG, GORDON, Champaign, Ill. (Univ. of Ill.)
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DUPONT, JUAN MUNOZ, Lima, Peru (Universidad Nacional Ingenieria)
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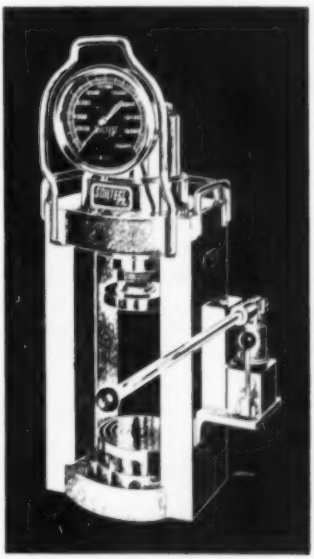

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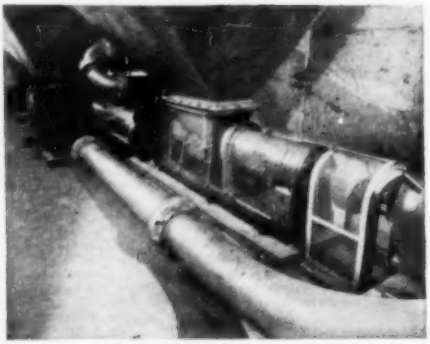

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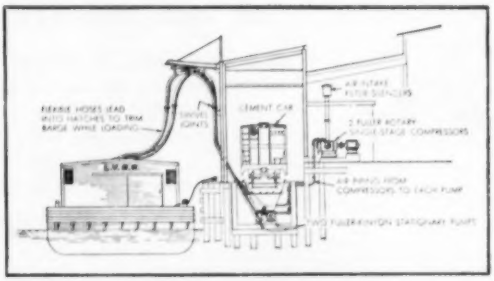

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Chain Belt acquires General Road Machines

Chain Belt Co., Milwaukee, has announced the acquisition of General Road Machines, Inc., of Niles and Newton Falls, Ohio. General Road Machines manufactures steel forms for concrete road, airport, curb and gutter and sidewalk construction, concrete finishing machines, and other concrete road building equipment. The company will be operated as a wholly owned subsidiary.

Dragon Cement sells assets to American-Marietta

Directors of Dragon Cement Co., Inc., and American-Marietta Co. have announced a plan whereby American-Marietta will acquire assets of Dragon.

Dragon, successor to Lawrence Portland Cement Co., is one of the oldest cement producers in the United States and operates plants in Northampton, Pa., and Thomaston, Me., with a combined annual capacity of 4,500,000 bbl. The plant is the only cement facility in the New England states.

American-Marietta's cement plants, located in Alabama and West Virginia, produce a total of 5,100,000 bbl annually. With planned expansion and the addition of Dragon's production, the company's capacity will pass the 10,000,000 mark.

Dragon will continue under active direction of president James H. Ackerman and its present executive, operating, and sales personnel. Mr. Ackerman will become a member of the board of directors of American-Marietta.

Kosmos plans expansion; capacity to be raised by new plant

Kosmos Portland Cement Co., Louisville, Ky., which has increased its capacity to over 2,000,000 bbl of cement per year, is planning a new plant ready for production by 1959. It is expected that the new plant will start with one large kiln with space allowed for others to be added. Ultimate production may reach 4,000,000 bbl annually with such a setup, it was announced recently.

Reynolds retires

John F. Reynolds, partner in the firm of Reynolds, Smith and Hills, architects and engineers, Jacksonville, Fla., retired recently.

Hedrich-Blessing

Prairie Avenue Courts, Chicago—for Chicago Housing Authority

Architects:
George Fred Keck
William Keck

Engineers:
Samuel R. Lewis & Associates (Mechanical)
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Lower over-all costs and flexibility of design were the major factors which influenced architects George Fred Keck and William Keck in their selection of reinforced concrete for the new Prairie Avenue Courts project.

On many other important public housing projects and apartment buildings from coast to coast, reinforced concrete is also providing better structures for less money. It is a flexible medium, inherently firesafe, and highly resistant to wind, shock, and quake. Furthermore, reinforced concrete buildings start quicker . . . are completed sooner because all necessary materials are readily available from local stocks. On your next job . . . avoid costly delays—design for reinforced concrete!

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Tools, Materials, Services

Under this heading note is made of producer literature and products of presumed technical interest to ACI users of tools, equipment, materials, accessories, and special services.

Fire resistance ratings

A booklet entitled "Vermiculite Fire Resistance Ratings for Plaster, Acoustical Plastic, and Concrete," has been published by the Vermiculite Institute. It contains 38 drawings that show fireproofing details for both concrete and steel roof and floor assemblies, columns, beams, girders and trusses, panel or spandrel walls, and solid plaster partitions. The constructions are described as tested.—Vermiculite Institute, 208 South LaSalle St., Chicago 4, Ill.

Ice melter

A chloride-free ice and snow melting material in prismoid form, reputed to be harmless to pavements, metals, and vegetation was announced recently. Known as Ice Rem-CF, it contains neither calcium nor chlorides, and does not produce a heat effect as part of its melting process. Manufacturer states that it will not corrode aluminum and other metals.—Speco Inc., 7308 Associate Ave., Cleveland 9, Ohio

Conveyor

Elevations to 20 ft at 30 deg are possible with a 40-ft conveyor now in production. Powered by a 9-hp Wisconsin gasoline engine, this unit reportedly can place 1 cu yd per min in the horizontal position. A

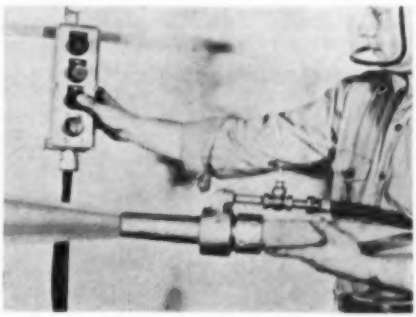
snub pulley has been added to increase belt power up to 20 percent; pulley is designed to prevent packing of concrete.—American Conveyor Co., 2133-37 South Christiana Ave., Chicago 23, Ill.

Tool drives "nails" into concrete with a hammer

Workmen can fasten to concrete or steel with a hammer using the Omark hammer drive hand fastening tool which requires no power source such as cartridges, electricity, or air. Tool concentrates the force of a hammer blow on the head of a special hardened steel drive pin, which is inserted into the barrel of the tool from the bottom. A plastic washer holds the pin steady while it is being driven, and a driving ram is pushed into the barrel from the top of the tool. The tool is then held securely against the receiving material while two or three hammer blows are struck on the driving ram head, which forces the drive pin into the concrete. The plastic washer disintegrates at the last hammer blow, leaving a clean fastening.—Omark Industries, 5001 S. E. Johnson Creek Blvd., Portland 6, Ore.

Jetcreter hook-up

A remote control hook-up is now on the market for Jetereter, a machine used for pneumatically applied concrete, for air-placement of refractory materials, and lining of cupolas. First the hopper of the Jetcreter is filled with the necessary materials. Then, remote control unit is set within easy reach of the



nozzle man, who operates the controls for stopping and starting the gun. This remote control unit eliminates the need of a gun tender. It is designed to be used with the electric motor powered Jetcreter models; control unit operates on 110 v.—Engineered Equipment, Inc., 1001 Linden Ave., Waterloo, Iowa

Apparatus for solving problems of statics

The determination of forces arising in the sections of continuous beams and frameworks requires the moments to be calculated at the supports or joints. These calculations involve the solution of systems of linear equations of many unknowns.

An electric apparatus, called the Statometer, is said to dispense with the need for time-consuming calculations. With knobs adjusted according to the known parameters of the beam, the device is claimed to find automatically the unknown support moments of a continuous beam or the joint moments of a frame without sideway.

The apparatus works on the analogy between static and electric quantities, that is, for static quantities of moment, angular rotation, and stiffness factor the corresponding electrical quantities are voltage, current, and resistance, respectively. A system of circuits is embodied in which the same mathematical correlation exists between the electric as between the analogous static quantities. The apparatus may be used to cope with a maximum of ten unknown joint rotations.—*—M. Rozsa, Dioszegi u. 37, Budapest, Hungary*

Lightweight concrete wall passes fire test

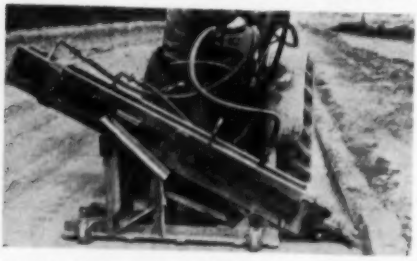
A 4-hr test to determine the effective fire resistance of an 8-in. Rocklite lightweight concrete masonry wall was conducted at the University of California recently. Wall was built to conform to the minimum require-

ments of the Los Angeles building code for concrete block construction with reinforcing steel 24 in. on center, with the two intermediate cores between concrete studs filled with 9/16-in. Rocklite coated expanded shale aggregate to serve as an insulation.

The test was followed immediately with the standard hose stream test, using water pressure of 45 psi. The wall resisted both the high heat and the severe thermal shock and force of the water stream.—Rocklite, P. O. Box 1372, Ventura, Calif.

Mobile hammer

A mobile portable differential-acting pile driving hammer, designated as DGH-100, is shown being used with a Le Roi Tract-Air, incorporating a 105-cfm compressor breaking concrete curbing. With this one-man operation the highest production was reportedly 3000 lineal ft of 9-in. curb per day, and the



lowest was approximately 1500 lineal ft per day. The hammer is fully automatic, small enough to carry in a jeep, and operates with compressed air or steam. It is just over 4 ft long, delivers a rated striking energy of 386 ft, and total weight with impact plate is 786 lb. —Vulcan Iron Works, Inc., Dept. 101, 327 N. Bell Ave., Chicago, Ill.

Concrete repairs

Permagile, said to be capable of welding concrete, brick, cinder block, tile, and other masonry building products has been placed on the market. It is said to be waterproof, nonshrinking and nonexpanding. An epoxy-based industrial poly-plastic alloy, it is reportedly hard and tough, unaffected by aging or atmospheric conditions, and unharmed by alkalies or most acids or chemicals.

It is capable of repairing severe spallage and cracks in concrete and its most extensive use at present is in the restoration of concrete buildings, grain elevators, and tanks. It is also used to repair major cracks and gaps in concrete sewers, floors, basements, and exterior and interior walls. Other applications include industrial waterproofing and repair, vertical and overhead setting of tiles and panels, restoration of copings and other architectural detail, and surfacing of heavy-duty roadways.—Permagile Corp. of America, 37-23 Thirty-third St., Long Island City 1, N. Y.

Highway water repellent

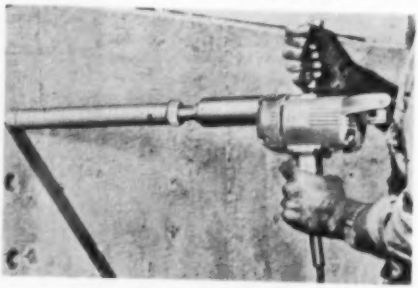
A silicone resin designed to reduce spalling of concrete bridges and highways is now being marketed as "Spallbar" highway water repellent. It may be used on highways as soon as the concrete has set sufficiently to support the weight of spraying equipment, usually about 7 days after the concrete has been placed. It may be applied at temperatures varying above 15 F. This repellent is not water soluble. As a result, it is said to be better able to resist loss in repellency from rain. Other reported advantages are superior resistance to freeze-thaw tests and greater resistance to alkalies. It employs a solvent of low volatility and high flash point to minimize hazards of toxicity and combustion.—Silicones Division, Union Carbide and Carbon Corp., 30 E. 42nd St., New York 17, N. Y.

Road forms

General purpose road forms, designed for fast handling, maximum durability and low cost, are now available in both single and double wedge lock types. The forms feature alloy steel construction, electrowelded for extra strength and long service life, the manufacturer says. Tapered sliding lock joint connections are reputed to assure quick, positive alignment. Lock joint connections also reinforce form treads at joints and are said to prevent tread distortion, even under heavy loads imposed by modern road building machinery.—General Road Machines, Inc., Niles, Ohio

Portable electric hammer

Designed for drilling holes from 3/16-in. diameter in concrete or masonry for steel pipes, slug-ins, and electrical installations, is a high-frequency portable electric rotary hammer. It requires no pressure, creates over 36,000 shock waves a minute, cuts up to 40 ft



deep, needs no transformers or rectifier, and features high speed water and air swivel. Hammer weighs approximately 10 lb, measures 16 in., and delivers 6000 bpm. It runs on regular 115-volt current. —Demo-Haines Tool Corp., N. 10th Machine Works, Enid, Okla.

Moisture barrier

Now being distributed is Deltafilm, a pure polyethylene film for permanent moisture vapor protection in building construction. Its makers say it will not rot, is unaffected by age and moisture, is extremely lightweight, strong, easy to handle, and low in cost. It serves as wall, ceiling, under slab, and crawl space vapor barrier. Unaffected by low temperature it reportedly will not crack.—Delta Co., 333 W. 24th Place, Chicago, Ill.

Bridge rehabilitation report

A 12-page technical report, covering maintenance and techniques for restoring and strengthening bridge piers, abutments, and structural members, is available from Intrusion-Prepakt. Eight detailed case histories

and two technical articles are included in Special Engineering Report No. 101 entitled "Bridge Rehabilitation."—Intrusion-Prepakt, Inc., Union Commerce Building, Cleveland 14, Ohio

Hardsurfacing brochure

Effectiveness of hardsurfacing in extending the life of equipment continually subjected to wear and impact in cement and aggregate plants is told in a brochure published by makers of Ranite hardsurfacing welding materials. The brochure, "Cement and Aggregate Plants Profit by Hardsurfacing" (Form 1500), presents case studies of hardsurfacing uses and contains photographs of actual applications. Examples shown include a gyratory crusher mantle, crusher rollers, mill hammers, screw flights and others.—Rankin Manufacturing Co., Dept. R-2, 616 S. Marengo Ave., Alhambra, Calif.

Bulk cement transport

Bigger payload and faster discharge of dry, free-flowing, nonabrasive material (such as cement, fly ash) are claimed by manufacturer of Model SST-11 bulk cement transport body. Truck or trailer units are available in aluminum, magnesium, or steel in lengths from 10 to 34 ft. Over-all height is 70 in. and over-all width 87 in. Trailer unit is self-supporting; body compartments and trip doors keep weight of material off 9-in. auger and permit selective unloading when necessary. Unloading speeds up to 2 tons per min are possible, depending upon material, company says.—Baughamn Manufacturing Co., Jerseyville, Ill.

Portable space heaters

Oil- and gasoline-fired units in capacities from 50,000 to 450,000 Btu per hr are available in American Air Filter's 1957 line of portable space heaters. "Thrifty" model is powered with a 1/3-hp electric motor. "Utility" features optional power plants, quickly interchangeable between gasoline engine and electric motor. "Deluxe" is all-automatic with optional, remote temperature control.—American Air Filter Co., Inc., 215 Central Ave., Louisville 8, Ky.

Form accessories handbook

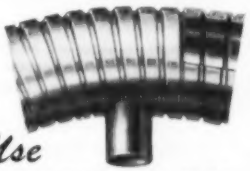
Richmond Screw Anchor Co., Inc., has published its "1956 Handbook of Engineered Tying Devices, Anchorages and Accessories for Concrete Construction." Strengths, working loads, and dimensions for each form-tying and anchoring device are given, together with drawings showing proper use, and detailed section of tested Form-Ty engineering procedures with formulas and tables. Six pages of blueprints cover aspects of form design and construction. Many charts and tables report full statistical studies of pressures, loads, and deflections in form design.—Richmond Screw Anchor Co., Inc., 816 Liberty Ave., Brooklyn 8, N. Y.

Proceedings V. 52

***Proceedings* V. 52 is completed with the publication of Discussion in Part 2 of this month's JOURNAL**

Next Month

- Report from Awards Committee, listing recipients of Wason Medal for Most Meritorious Paper, Wason Medal for Research, Construction Practice Award, Lindau Award, and Henry C. Turner Medal
- Announcement of 1957 Regional Meeting slated for last week in October, 1957, in Seattle
- More 1957 ACI Convention plans for February 25-28 in Dallas



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DISCUSSION

Discussion closed December 1, 1956

Aug. Jl. '56

Considerations for Construction of Subgrades and Subbases for Rigid Pavement—Subcommittee I, ACI Committee 325

Some Implications of Recent Diagonal Tension Tests—Phil. M. Ferguson

Conduction Calorimeter for Measuring Heat of Hydration of Portland Cement at Elevated Temperatures and Pressures—N. C. Ludwig and S. A. Pence

Bhakra Dam—Design and Construction Features—C. L. Handa and O. P. Chadha

An Expression for Creep and Its Application to Prestressed Concrete—Cevdet Z. Erzen

Empirical Time-Strength Relations of Concrete—Myron L. Goral

Discussion closes January 1, 1957

Sept. Jl. '56

Strength of a Concrete Slab Prestressed in Two Directions—A. C. Scordelis, K. S. Pister, and T. Y. Lin

Lining of the Tecolote Tunnel—E. R. Crocker

Theory of Stresses Induced in Reinforced Concrete by Applied Two-Dimensional Stress—Bruce H. Falconer

Some Effects of Carbon Dioxide on Mortars and Concrete—I. Leber and F. A. Blakey

Analysis of Inelastic Bending Stress in Concrete Beams—James M. Prentis

Discussion closes February 1, 1957

Oct. Jl. '56

Design Considerations for Concrete Pavement Reinforcement for Crack Control—Subcommittee IV, ACI Committee 325

Auditorium Framed with Prestressed Roof Girders—Eric C. Molke

Properties of Lightweight Aggregates and Lightweight Concretes—G. W. Washa

Structural Lightweight-Aggregate Concrete—Ralph W. Kluge

Helicoidal Staircases of Reinforced Concrete—Victor R. Bergman

Fatigure Tests of Pre-Tensioned Prestressed Beams—A. M. Ozell and E. Ardaman

Discussion closes March 1, 1957

Nov. Jl. '56

Considerations in the Selection of Slab Dimensions—Subcommittee II, ACI Committee 325

Guide for Ultimate Strength Design of Reinforced Concrete—Charles S. Whitney and Edward Cohen

Lightweight Aggregates for Concrete Masonry Units—C. C. Carlson

Insulating Concretes—R. C. Valore, Jr.

Prestressed Bridge Designed for Crane Load at Niagara River Weir—A. M. Lount

Particle Interference in Concrete Mixes—B. J. Butcher and H. J. Hopkins

Dec. Jl. '56

Proposed Recommended Practice for Evaluation of Compression Test Results of Field Concrete—ACI Committee 214

Mackinac Bridge Pier Construction—R. E. Davis, Jr., and C. E. Haltenhoff

Ultimate Flexural Analysis Based on Stress-Strain Curves of Cylinders—G. M. Smith and L. E. Young

ATTENTION . . .

A change in publication of

DISCUSSION

For papers appearing in July through December of 1956, discussions will appear at the end of June 1957 JOURNAL.

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To reduce the delay between publication of a paper and the appearance of discussion of that paper, the Technical Activities Committee has made this change. Discussion of the remaining papers in Proceedings Volume 53—January through June, 1957—will appear in Part 2, December 1957, along with the volume index as usual.

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JULY–DECEMBER 1956 DISCUSSION WILL APPEAR IN JUNE 1957